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1. Slots permit 1/16" adjustments.
2. Brace welded to switch plate.
3. Spring compression stop.
4. Pawl for locking wedge.
5. Spring steel welded to wedge.
6. Wedge shaped for contact on web and flange of rail.

Here's better rail bracing for turnouts

Is your rail bracing at turnouts good enough for wartime's heavier loads and higher speeds? If there's any doubt about it, give Bethlehem's Spring Rail Brace a trial.

This improved rail brace has extra strength and many other worthwhile features. It is a simple, adjustable, wedge-type brace. It has only two parts. One part is a combined rolled-steel switch plate and brace, the brace being heavily welded into a machined slot in the plate. The other part is a specially-shaped wedge on which is welded a heavy angular spring-steel piece.

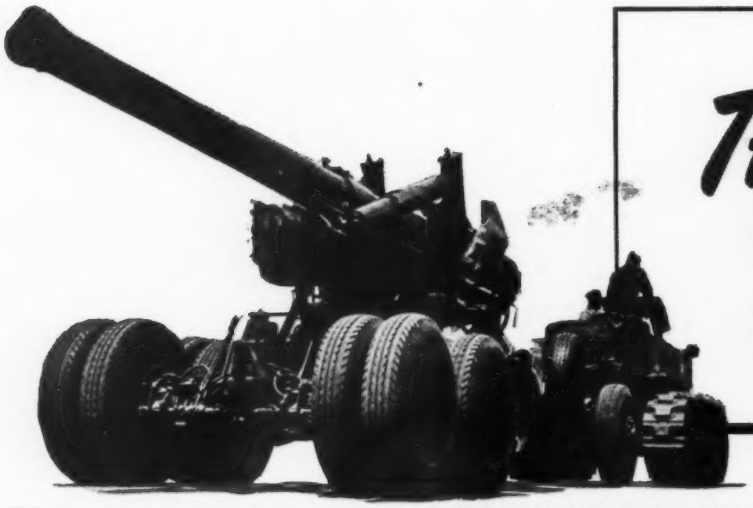
As this wedge is driven parallel to the rail, pressure is exerted against the web and flange. The compression of the spring, which will withstand 12,000 lbs. pressure before closing, provides considerable resilience for full recovery from side thrusts of the rails. It also maintains constant pressure on the rail, preventing track vibrations from loosening the wedge.

As an added safety feature, a pawl attached to the brace can be engaged in one of many slots on the side of the wedge when the wedge is driven into place, thus holding the wedge in position and maintaining spring wedge in any desired state of compression.

No special tools are needed to install or adjust the Bethlehem Spring Rail Brace. A spike maul or hammer is all that's needed. And this Bethlehem brace conforms to all A.R.E.A. standards.

Find out more about this strong, safe, long-lasting rail brace. Get in touch with the nearest Bethlehem representative, or write direct to Bethlehem Steel Company, Bethlehem, Pa.

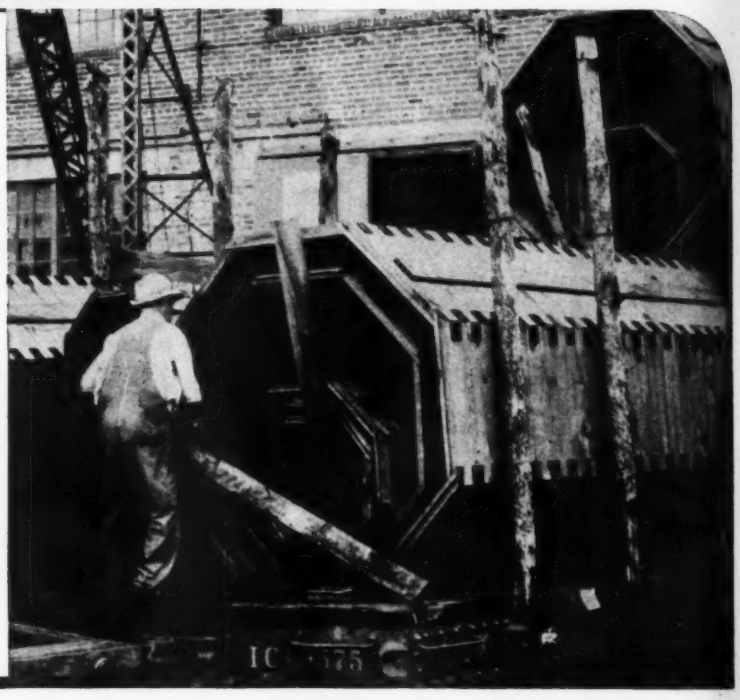
BETHLEHEM STEEL



THEY GET STEEL FOR GUNS

PHOTO BY OFFICE OF WAR INFORMATION

YOU GET PIPE for DRAINAGE



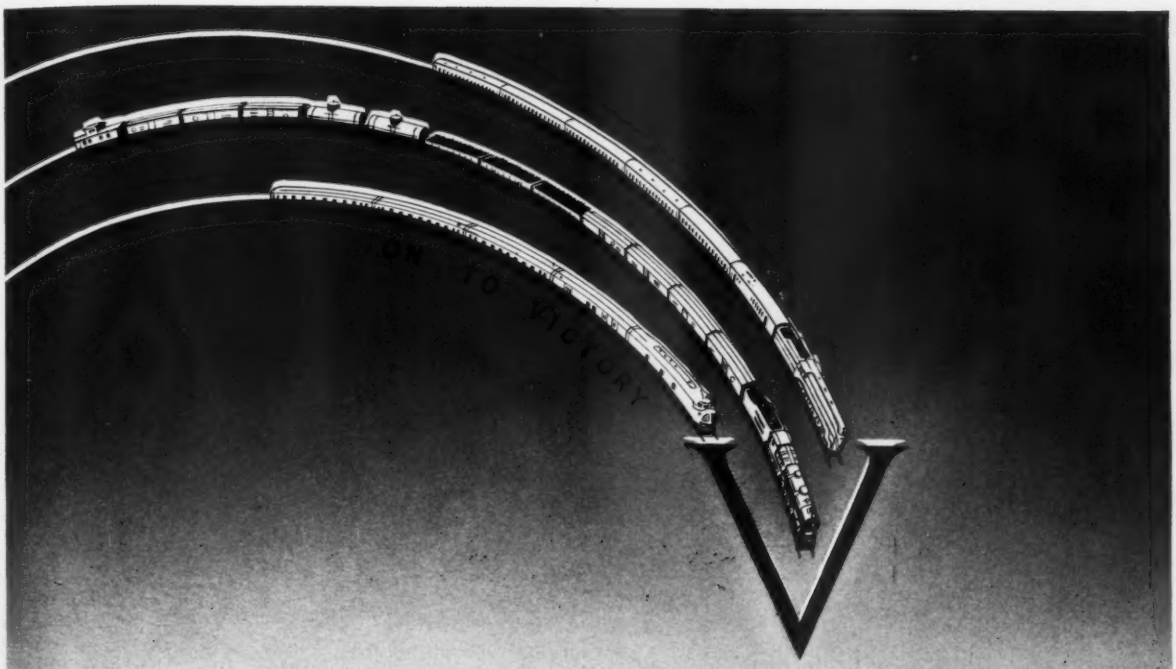
Here's a product that's backing up our fighters 100%. It's ARMCO Emergency Wood Pipe.

The engineers who created it are specialists of many years' experience in drainage work. They designed a pipe that will handle wartime railway drainage economically, efficiently and *patriotically*.

ARMCO Emergency Pipe uses no critical materials. The metal normally required for steel sheets and bands, wire mesh or reinforcing goes into tanks, guns and ships. This pipe may also save up to 80 per cent in transportation. That's because it is light in weight and nestable. Trucks, tires and railway cars are conserved for other vital uses. The design of ARMCO Pipe makes it *practicable* for wartime drainage. It has ample strength for the heaviest loads, and no skilled labor is needed for handling or quick installation.

You can do a real drainage job with ARMCO Emergency Wood Pipe—even in wartime. Steel should not be used unless engineering integrity demands it. This means that the metal you save goes to our fighting men as vital equipment. And they need it . . . lots of it. ARMCO Railroad Sales Co. Inc., 971 Curtis Street, Middletown, Ohio.

ARMCO ARMCO **EMERGENCY PIPE**



TO OUR AMERICAN RAILWAYS:

WITH the most unusual demands for service, we want to express an opinion which is shared by all fellow Americans—that our American Railways, operating under severe handicaps, have accomplished transportation feats heretofore thought impossible and their part in winning the war will certainly be recorded in history.

We extend our congratulations on a task well done.

POOR & COMPANY

A New Flag Flies Over Union Metal Today

THERE'S a fresh look of determination in the eyes of the men and women of Union Metal today—a look that is accompanied by a greater hum of activity than we have ever heard around here before. For, outside our plant, flying high for all to see, is the coveted Army-Navy E Pennant.

That new flag has done something to all of us—something we can't quite explain, but which certainly augurs no good for America's enemies. And, from here on in, we pledge to do our best to *continue* to merit this great honor which the armed forces have conferred upon us, and to give to them the fullest support, both moral and material, of which we are capable.

Special War Products—Cargo Booms and Masts, Practice Bombs, Recoil Mechanisms, Gun Mounts.

Regular Products—Steel Street Lighting Standards, Monotube Steel Pile Casings, Steel Skids and Boxes, Monotube Steel Poles for distribution and transmission lines.

THE UNION METAL MANUFACTURING COMPANY
CANTON, OHIO
Craftsmen in Steel Fabrication

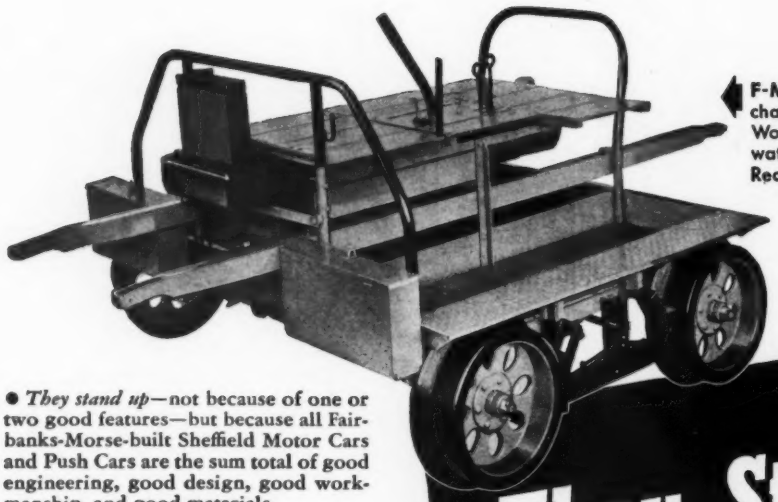
BUDA TRACK LINER

- **BETTER LINING** — Does not raise rail.
- **EASIER HANDLING** — Light in weight, compact; wedge slides under most rails without need for digging out ballast.
- **SAFETY with NO LOST TIME** — When trains pass, bars may be pulled out and liner left in place under the rail.
- **GETS MORE DONE** — 3 men with Buda liners can align more rail than 11 men with conventional lining bars!

WRITE FOR THE BUDA TRACK LINER BULLETIN!

THE BUDA CO., Harvey (Chicago Suburb) Ill.

PUSH CARS | JACKS *for every purpose* | MOTOR CARS | *Maintenance of way* EQUIPMENT



F-M Maintenance Car No. 57—clutch or roller chain drive. Rubber-cushioned, quiet ride. Wood-center wheels. Steel wheel hubs. 9-hp. water-cooled engine with Timken bearings. Rear-end lifting weight 87 pounds.

They Stand Up

First on the Rails and Still First . . . F-M Sheffield Motor Cars and Push Cars have been proved on the rails of a nation

● *They stand up*—not because of one or two good features—but because all Fairbanks-Morse-built Sheffield Motor Cars and Push Cars are the sum total of good engineering, good design, good workmanship, and good materials.

First to introduce 3-point suspension of the engine . . . first to incorporate positive chain drive . . . first with pressed steel automobile-type frames . . . first with one-piece steel wheels . . . first with Timken Tapered Roller Bearings . . . the record of Fairbanks-Morse Sheffield Motor Cars is one of constant improvement. And each and every improvement has been tested on American railroads—by American railroad men before being put into production.

The complete line of Fairbanks-Morse-built Sheffield Motor cars includes sizes ranging from the one-man car on up to heavy-duty motor cars. Bulletin supplied on any size without charge or obligation. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.

F-M No. 36 Push Car—used by several of the largest railway systems as standard equipment. Built for heavy-duty work, framework and deck are oak. Conservatively rated at 10,000 pounds capacity with standard 2″ axles. Timken bearings are standard equipment. Deck is 67″ x 84″.

F-M Heavy-duty Motor Car No. 40-B—76″ seat, 27″ wide. Ample room for section or bridge gangs. Horizontal valve-in-head, two-cylinder, opposed-type 4-cycle air-cooled engine. Drop-forged, heat-treated high-carbon steel crankshaft runs on Timken Tapered Roller Bearings. One-piece pressed steel wheels. Positive four-wheel brakes.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
SCALES
WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

Railway Equipment

Gas Engine Driven Model

RACINE *High Speed* PORTABLE RAIL CUTTERS

Save men— keep traffic moving

Does the Job Right on the Track

1. For cutting and fitting of rails at interlocking plants, crossings and switches.
2. For closing of track in rail-laying operations.
3. For accurate cutting of rails for insulated joints.
4. For proper staggering of joint in curves.
5. For removing split or worn and battered rail ends.
6. For cutting out portions of wheel-burned rails and fissures.

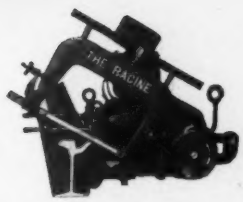
RACINE RAIL CUTTERS—*DO IT FASTER, EASIER AND CHEAPER*

Racine's Portable Rail Saws can easily be transported by just two men. Only one operator is needed to operate machine and make the cut. Cuts 80-lb. rail in five minutes, 100-lb. rail in seven minutes. These Saws will cut pieces as small as three-tenths of an inch in length. Eliminates extra handling of rail, traffic delays and heavy "on track" equipment. No shattering of rail ends, overheating or burning of grain structure. Racine Rail Saws assure smooth and accurate facing of rail. Their use saves power, tool and time costs. They are the choice of prominent railroads everywhere.

RACINE HYDRAULIC METAL CUTTING MACHINES—HYDRAULIC PUMPS AND VALVES

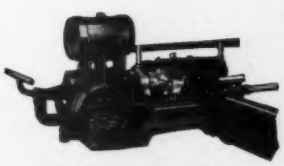
The Production Saws of Modern Industry for general purpose and high speed production work, in railroad repair and maintenance shops. Capacities 6″ x 6″ to 20″ x 20″. Racine "Variable Volume" Hydraulic Pumps—a modern source of force for bending, forming, feeding, molding and many other operations. Capacities up to 30 G.P.M. at 50 to 1000 lbs. pressure. Racine Oil Hydraulic Valves—sizes ¾″ to 1½″—manual, electrical or mechanical operated.

Request complete information and prices.
Address Dept. RE-S.



Electric Motor-Driven Model

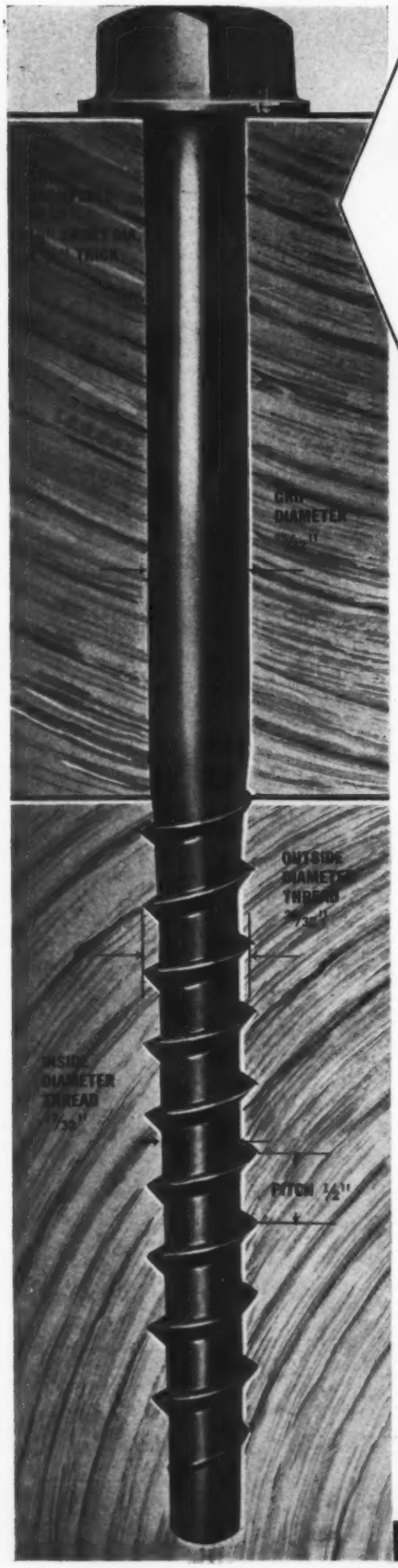
For use on electric railroads. Available with proper electrical characteristics.



Air-Driven Model

For use where compressed air is available. Equipped with rotary or vane-type compressed air motor, developing over 1 H.P.

STANDARD FOR QUALITY AND PRECISION
RACINE
RACINE TOOL and MACHINE CO.



for wooden structures

Oliver announces a new and better SCREW SPIKE

With greater holding power than previous designs, this new Oliver Screw Spike is well suited for use on wooden trestles, bridges and other structures. Its greater holding power is accounted for by the fact that the Oliver Screw Spike must be *screwed in all the way*. A half-inch hole is drilled and the spike is screwed in. The pilot point makes it unnecessary to do any driving—even to start the spike.

The new Screw Spike is 25/32 inches in diameter and 10½ inches in length. The grip, which goes through the first timber, is 4½ inches long and the screw portion is 6 inches. Thousands of these spikes have been delivered to one prominent railroad and thousands more are on order.

The integral washer head assures a tight grip and eliminates a possible source of corrosion between washer and head.

Our representative will gladly show you a sample.

OLIVER
IRON AND STEEL
Corporation

SOUTH TENTH AND MURIEL STREETS · PITTSBURGH, PENNSYLVANIA

They're crowding the rails!

The rails are taking a terrific pounding. Never before have they carried a heavier load with closer headways. Under these severe conditions, the railroads are forced to use rail and rolling stock for longer periods than in ordinary times.

Ramapo Ajax has always preached *and practiced* the doctrine of building and selling railroad material that would give the longest and most efficient service. All our customers are now reaping the benefit!

Ramapo Ajax Depth Hardened Crossings, Switch Point Locks, Switch Stands, Rail Curve Lubricators, Frogs, Switches and track accessories are outstanding in their efficient, long life service. They are helping the railroads carry the ever increasing demand on already heavily crowded rails and taxed rolling stock. They are doing their job! They are returning dividends in uninterrupted service, so necessary under these unusually severe war conditions.

Brake Shoe

3293

RAMAPO AJAX DIVISION RACO **230 PARK AVE., NEW YORK**

HILLBURN, N. Y. • NIAGARA FALLS, N. Y. • CHICAGO, ILL. • EAST ST. LOUIS, ILL. • PUEBLO, COLO. • SUPERIOR, WIS. • LOS ANGELES, CAL. • SEATTLE, WASH.
NIAGARA FALLS, ONTARIO

Spouting pipes show how water pumps through "mushy" subgrade under every passing wheel.

Grout injected into water pockets displaces water and fills voids—hardens and stiffens the subgrade.

Cement Grout will stiffen "mushy" tracks for war service

Portland cement grout, forced into water pockets and loose and yielding subgrade, will eliminate difficulties due to "mushy" tracks.

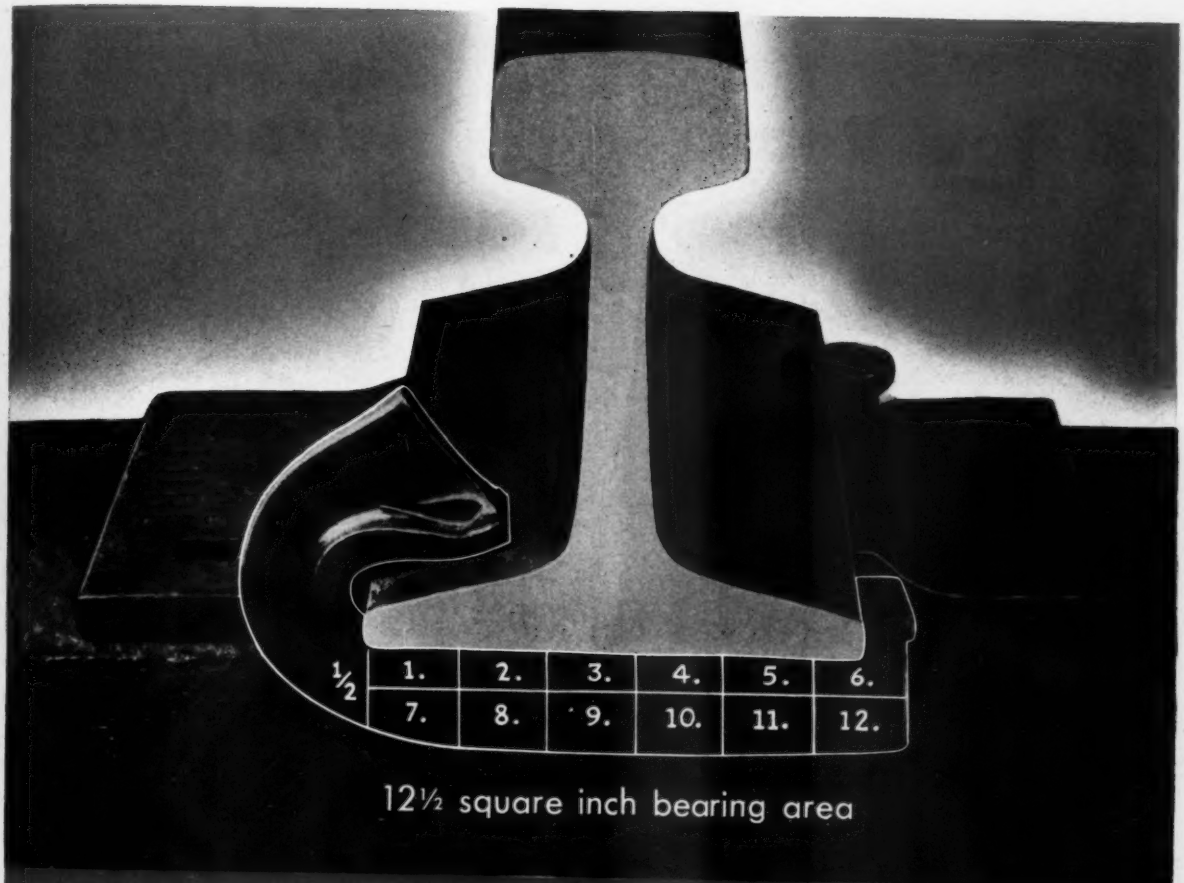
Pressure grouting stiffens the subgrade, prevents surge action of water, changes water pockets into load-spreading slabs and helps keep track in line and grade. No time need be wasted in slow orders. Thousands of man hours of maintenance time may be saved.

As practiced by railroads today, pressure grouting is done under traffic with no interruption to operations. Regular work crews can do the job. No special equipment is used—just tools and machines found in most railroad stores.

You can put your soft track in fighting order with pressure grouting. Ask us how other railroads are doing this job now.

PORTLAND CEMENT ASSOCIATION
Dept. A6-27, 33 W. Grand Ave., Chicago, Ill.

BUY MORE WAR BONDS



12½ square inch bearing area

Prolong Tie Life

The prevailing tie scarcity makes it a necessity to prolong the life of ties now in track.

The IMPROVED FAIR ANCHOR with its large bearing area prolongs TIE LIFE.

THE P & M. CO.

CHICAGO • NEW YORK • DENVER • CLEVELAND • ST. LOUIS
WASHINGTON • SAN FRANCISCO • ST. PAUL • BOSTON

Ideas Win Wars

"Boss, we certainly have some good friends on the A.B & C. railroad," said the star salesman to his railway sales manager.

"How's that Bill?" replied the railway sales manager.

"They're so pleased with the equipment we sold them last year. It's a life saver for them now when they're so short of men."

"That's great, but what are they doing with it that's so unusual?"

"They're making it do everything but talk. They're using it for a lot of jobs we never thought of."

"We ought to tell that to the other roads."

"That's true, for these other roads can do as well if they get the idea. I wish we could get that story into their hands."

"We've got to, Bill—but how?"

"That's what I asked the chief engineer of the A.B. & C."

"What'd he say?"

"He said to advertise in *Railway Engineering and Maintenance.*"

"I hadn't thought of that."

"I hadn't either—but it'll work, for every maintenance man will see it in that magazine."

"That's true—for they all read it. I'll arrange to start in the next issue, for ideas win wars in these days."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

The "JEEP" OF THE RAILROAD

The title isn't ours . . . it comes from the men who use the cars. Nor is it applied to any one specific Fairmont, for each group of rail-riders seems to bestow it upon the car that happens to be their ranking favorite. We accept the comparison as the highest compliment to the versatility, power, rugged endurance, and "get-there" dependability of Fairmont cars under all conditions.

This flexibility of service, along with features of safety and comfort, are the outcome of long, practical experience . . . the result of studied design for the saving of time and energy plus rigid manufacturing inspection for accuracy.

Inasmuch as the "JEEP" in the National Services is noted for low-cost operation and maintenance, we accept the compliment as one more evidence of why more than half the cars in service today are Fairmonts. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

★

The M19 Series D is a 1 to 4 man Inspection Car with rear lift of only 95 lbs.

Performance ON THE JOB COUNTS

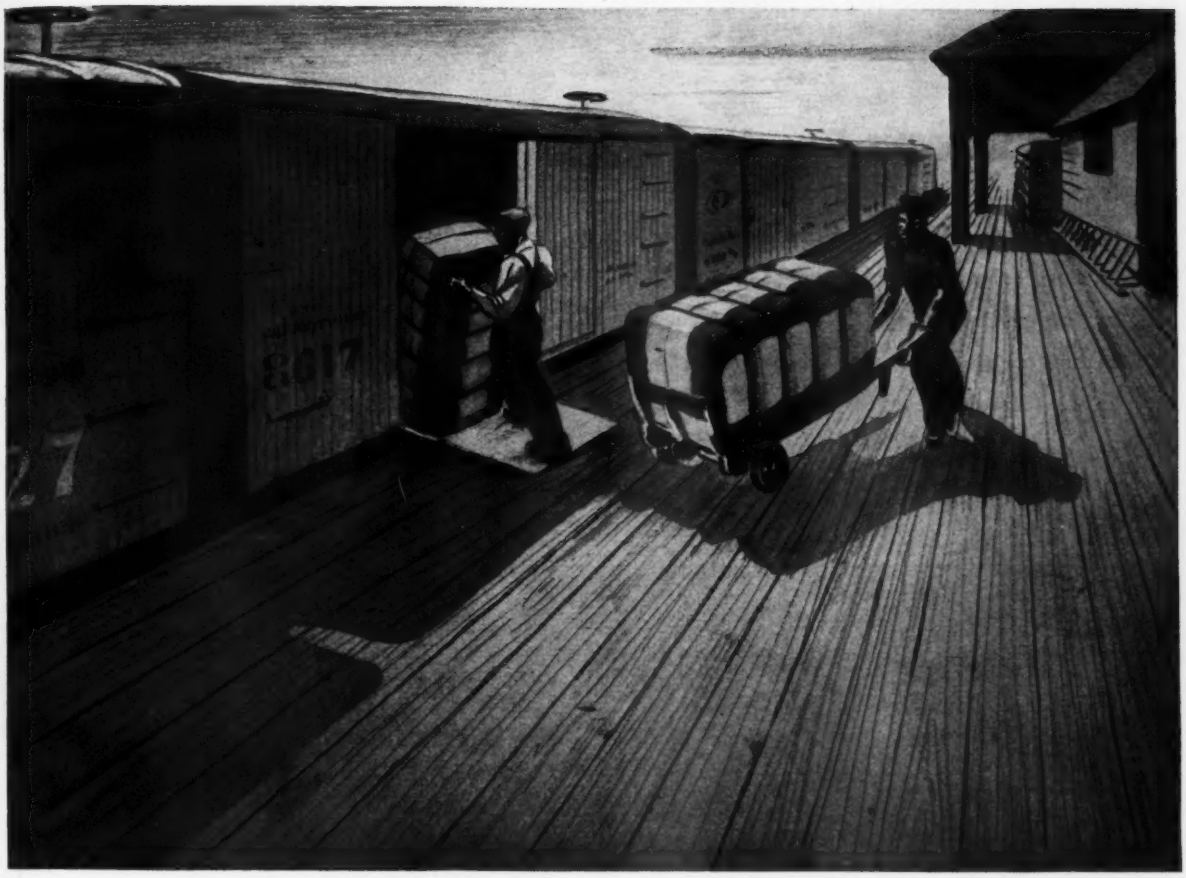
THESE POSTERS WILL REMIND YOUR EMPLOYEES OF THE NEED FOR PROMPT CYLINDER RETURN

To remind your employees of the importance of prompt return of oxygen and acetylene cylinders, a series of colored posters suitable for posting on bulletin boards and shop walls has been made available by the Oxweld organization. Three of this series are shown here. In order to help assure continued adequate supplies of these vital gases, it is suggested that you ask an Oxweld representative to supply you with an assortment of these and other posters in whatever quantities you need. If you prefer, you can obtain a sample set by writing for it.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark.



How to lower maintenance costs on loading platforms

NEVER before in American history have such vast volumes of munitions, machinery, cotton and foodstuffs traveled our rails. And never before has it been so necessary to keep 'em rolling!

Good insurance against costly and time-consuming replacements is the use of Chromated Zinc Chloride-treated wood.

In loading platforms, for instance, "CZC"-treated wood resists decay, provides greater resistance to abrasion—makes platforms last *many times longer*—cuts maintenance costs—saves valuable man-hours spent on repairs—gives a clean, odorless surface which is particularly important where cotton and foodstuffs are handled.

"CZC"-treated wood has many features which recommend it for general and widespread railway use. Because it is highly resistant to fire, it is extensively used for bridge ties, stringers, fire stops, tunnel linings—wherever the threat of fire exists. And for all construction subjected to severe conditions—such as pier decking, loading platforms, warehouse flooring—"CZC"-treated wood will give you better performance—require less maintenance.

Specify "CZC"-treated wood on your next job. See how it permits the use of less expensive, more readily available grades of timber. There is ample preservative and treating capacity to meet both military and essential transportation needs.

Write for free booklet, "*Facts About 'CZC.*" E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington, Del.

DU PONT
REG. U. S. PAT. OFF.

CZC

CHROMATED ZINC CHLORIDE

WOOD PRESERVATIVE

BETTER THINGS for BETTER LIVING . . . THROUGH CHEMISTRY

Every WOODINGS RAIL ANCHOR

is forged from special high-carbon steel. It is then carefully oil quenched and heat treated in electrically-controlled furnaces. Painstaking inspection at every phase of manufacture assures a high quality product endowed with unusual durability.

But The Final Test . . . is Performance!

Woodings Rail Anchors Can Be Applied Quickly and Easily with a Light Tool Furnished with the Anchors. This Tool Prevents Over-Driving and Damage to the Anchors and to the Rail.

Millions of WOODINGS RAIL ANCHORS

are in service on most of America's leading railroads, where they have proved:

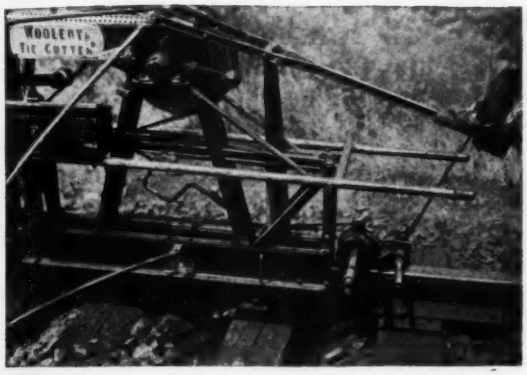
- Their outstanding ability to retain efficiency on reapplication.
- Due to the fact that the Anchor is made of the widest section of steel on the market, the possibility of damage to equipment due to derailed wheels, is reduced to a minimum.
- Woodings Anchors are quickly and positively installed by simply snapping the Anchor on the rail as shown in the illustration.
- Low Cost—Long-lived Dependable Service.

WOODINGS FORGE & TOOL CO.

VERONA, PA.

WAR WON'T WAIT

Speed Tie Renewals to War Tempo



Compactly built, the Woolery Tie Cutter can be operated on the track and moved on or off track by one man.

With the WOOLERY TIE CUTTER

Makes Every Minute and Every Man Count For More

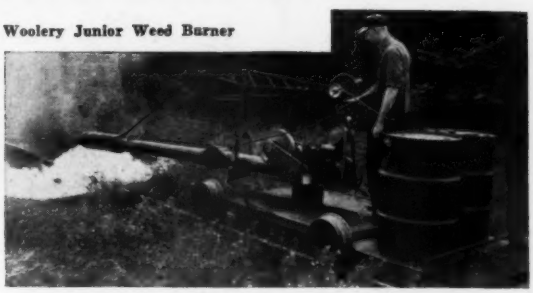
You can finish your tie renewal programs much sooner this year with Woolery Tie Cutters, because these efficient machines speed the work from start to finish. The Cutter quickly saws the tie into three pieces which can be easily lifted out by one man—the placing of the new tie is speeded and simplified because the tie-bed has not been disturbed—more time and manpower are saved in the elimination of trenching and because tamping is reduced to a minimum.

Save time and labor on every tie renewal operation with the Woolery Tie Cutter and, incidentally, reduce renewal costs as much as 30 per cent. Ask us TODAY to give you more vital reasons why you *too* should let the Woolery Tie Cutter simplify your tie renewal problem.

OTHER TIME AND LABOR SAVERS

WOOLERY WEED BURNERS

Woolery Junior Weed Burner



For fastest, most economical maintenance of clean track all-year round. More than 60 roads are now using Woolery Weed Burners . . . convincing proof of their efficiency in removing weeds quickly and thoroughly, with minimum employment of manpower. Available in 5-burner, 3-burner, 2-burner and 1-burner models.

WOOLERY MACHINE COMPANY MINNEAPOLIS MINNESOTA

PHOTO-ELASTIC STUDIES OF HEAD CONTACT TOELESS JOINT BARS

No. 2 of a Series of 4
(No. 1 see March '43 Issue)

Bolting Strains

Intensity of Strain is proportional to the number of lines

Bolting and Eccentric Loading Strains

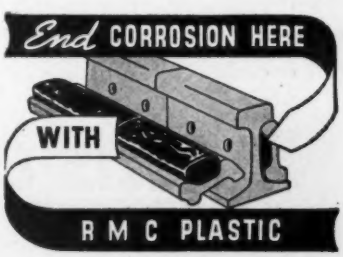
Protect Them With RMC PLASTIC

Wherever rail is subjected to the corrosive attacks of brine drip, cinders and moisture, RMC PLASTIC will provide a protective covering that will keep rail joints immune to metal deterioration.

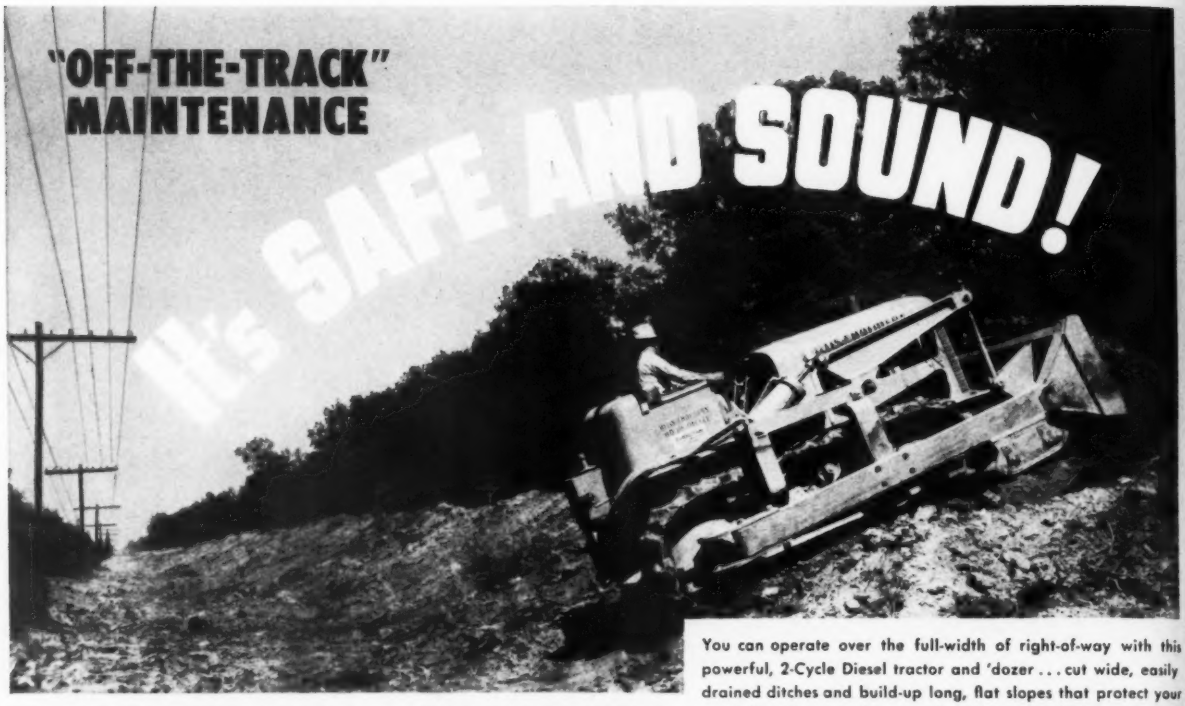
RMC PLASTIC is easily applied on the inner faces of the joint bars. When they are bolted to the rails (with the handy RMC Tool), the bolting action solidly packs the Plastic into every section of the joint assembly.

RMC PLASTIC, packed solidly into every section of the joint assembly, thoroughly lubricates and protects the fishing surfaces, shanks and threads of nuts and bolts. When bolts are properly tensioned, this eliminates frozen joints due to corrosion, permits proper rail expansion and contraction and thereby reduces the danger of kinks and humps in the tracks.

Why Let Corrosion Wreck Your Rail Joints When You Can Get *all* the RMC PLASTIC You Need—RIGHT NOW!



RAILWAY MAINTENANCE CORP.
PITTSBURGH PENNSYLVANIA



You can operate over the full-width of right-of-way with this powerful, 2-Cycle Diesel tractor and 'dozer . . . cut wide, easily drained ditches and build-up long, flat slopes that protect your road bed from washouts — all without interfering with your trains. Same outfit is ideal for clearing work—uprooting trees, digging out boulders and stumps and hauling them away!

SAFE TRANSPORTATION...SOUND INVESTMENT

Working free of the tracks, Allis-Chalmers grading and maintenance units not only minimize the danger of accidents but do not interfere with train schedules... also put in more working hours. Operate at low cost, handle any type of grading at any location. You can economically "spot work" them — clean-up miscellaneous jobs in a hurry... or handle major cut and fill and clearing work. These are the same powerful outfits that are used by thousands on every type of tough construction, on logging, mining, in the oil fields — wherever there's earth to be moved, land to be cleared or heavy hauling to be done... now also serving Uncle Sam and the Allied Nations in every theatre of the war.

Let us put you in touch with an Allis-Chalmers dealer, who will be glad to consult with you on the equipment most suitable to your work. He will also help you determine if you are eligible, under government regulations, to obtain new units — if not he may be able to help you get good used outfits. Write for full descriptive literature.

If you have to haul dirt from a borrow pit or make cuts and fills that require carrying of the material, just add a 2-wheel scraper to your 2-Cycle Diesel and 'dozer. You're prepared for any type of work with this complete dirt-moving outfit. Scraper rear-dumps . . . on the level or up the slope.

You can handle a multitude of grading jobs with this one-man operated, all-'round, tractor-shovel outfit — make your ditches, widen slopes, carry ballast to your track beds and spread it. Small size enables it to work in narrowest places. Many railroads find this an ideal unit.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE, WIS., U. S. A.

No. 174 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

June 1, 1943

Subject: Reading in War Time

Dear Reader:

"Do railway men have time to read your publication in these busy days?" This question was put to me a few days ago by an advertiser. "They take the time," I replied, "even more than in more normal days." "What's your evidence?" he asked. Thinking that the same question may have arisen in your mind, I will repeat the answer I gave him.

In the first place, it happens that a check has been made recently through members of the National Industrial Advertisers Association of the extent to which business papers are being read in these war-time days, in comparison with more normal times. This test showed an increase of 12 per cent in the reading of the text pages; it showed also an increase of 20 per cent in the reading of advertising pages. In this canvass, some men reported that they were reading less in these days but many of them were quick to add that their reading was more selective, and grooved to their individual problems. In spite of this fact, it was found that 56 of every 100 subscribers to business papers are reading the editorial pages more than in normal years and that 60 of every 100 are reading the advertising pages more.

As you think the matter through, I am sure that you will concede that these results are not surprising. Your business paper, Railway Engineering and Maintenance, comprises an "arsenal" of information today from which you draw information about methods, materials and equipment that others have found helpful in their work in these days. Such information is helpful to you at any time; it becomes doubly helpful to you when you are working under pressure and when you need every new idea and every short cut that will help you increase your output. As a result, I feel certain that you are reading your copies of Railway Engineering and Maintenance more thoroughly from cover to cover, editorial and advertising pages alike, than ever before.

Am I right?

Yours sincerely,

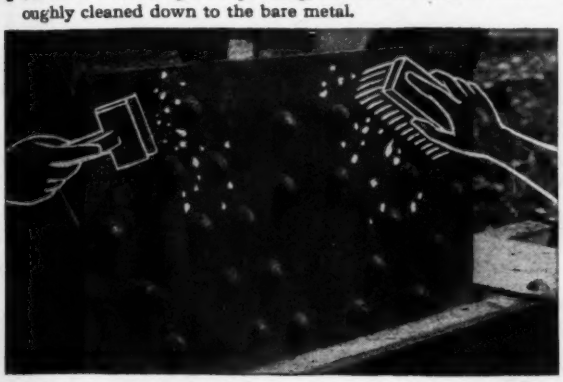
Elmer T. Howson

Editor

ETH
as

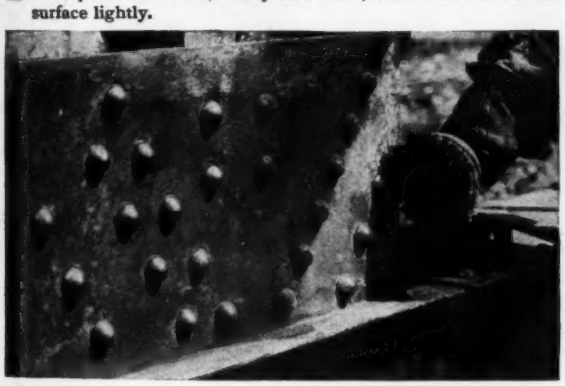
How to Renew Rusty Bridge Surfaces by Oxyacetylene Flame Cleaning

1 Right: Paint-lift, rust and scale have scarred this steel bridge surface. To assure good repainting, the surface must be thoroughly cleaned down to the bare metal.



2 The first step in restoring the surface is to scrape off the very loose paint and loose, heavy rust scale; then brush down the surface lightly.

3 Next, an application of the oxyacetylene flame cockles the old paint, loosens imbedded rust and scale, and drives out moisture.



4 Power brushing with a wire brush cleans off the semi-tight scaly material which the oxyacetylene flame has loosened.

5 Here's the renewed bridge surface, ready for repainting. The clean, dry surface assures a lasting paint job and long protection against rust.

Air Reduction service engineers will gladly assist you in the application of the modern flame cleaning method. For further information write your nearest Airco office.

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HOW AND WHY

WILLIAMS' TOOLS AID WAR PRODUCTION

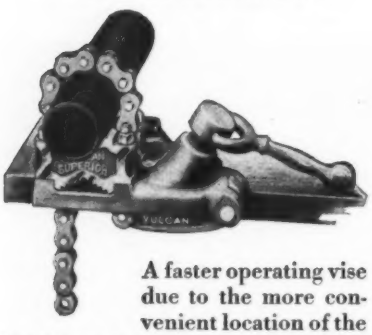
DATA ON "VULCAN" CHAIN PIPE VISES

● Williams' "Vulcan" Chain Pipe Vises are available in two basic types: "Vulcan Superior", with adjusting handle on top for greater convenience to the operator, and "Vulcan", of conventional design with handle below the base.

In addition, the Williams' line also includes the "Vulcan" Vise Stand —a complete unit combining Vise, Stand and Pipe Bender. A description of the construction and utility features of these Vises is given here to facilitate selection of the most efficient type for any specific service.

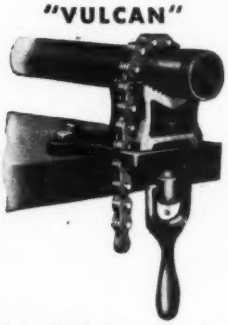
Williams' "VULCAN", *the original Chain Pipe Vise, is still the favorite among experienced pipe workers.*

"VULCAN SUPERIOR"



A faster operating vise due to the more convenient location of the handle on top of vise and above the bench. This vise also has reversible jaws, which double the service life of the tool. "Vulcan Superior" has one half inch larger capacity than other chain vises of corresponding size. Made entirely of tough wrought steel with drop-forged base, jaws, handle and chain arm. Available in two sizes, for pipe 1/8″ to 4-1/2″.

"VULCAN"



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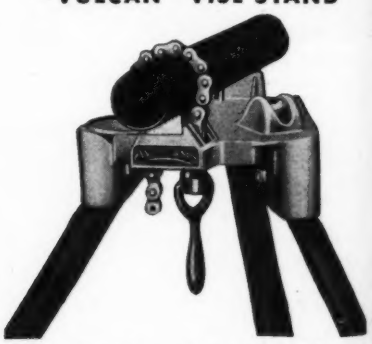

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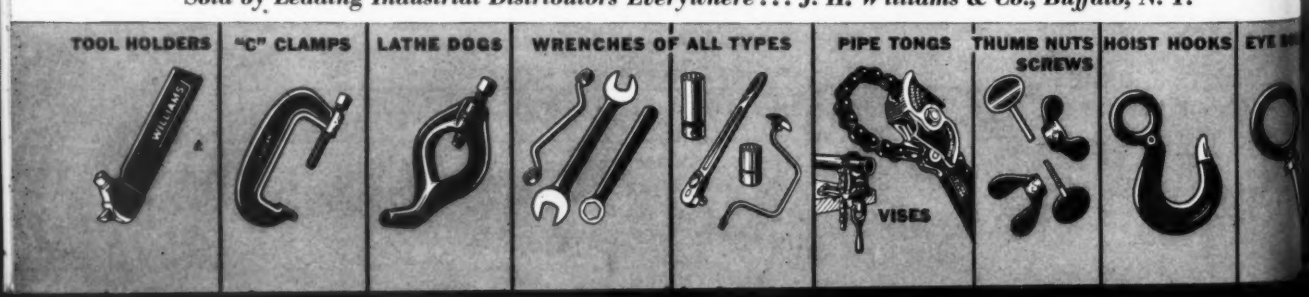

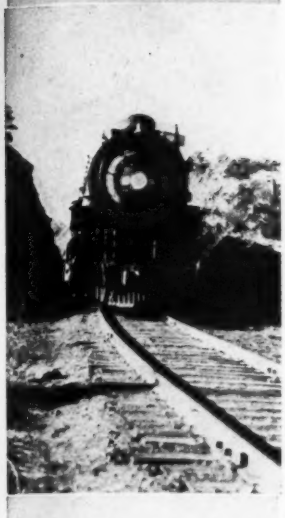

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Railway Engineering and Maintenance

Freight Traffic—

Makes New Records for the Railways

While the passenger trains provide the glamour in railway service and while the sleek streamliners have captured the fancy of the public as no other phase of railroad service ever has, every railway employee knows that it is the freight trains that pay the bills. Yet it is doubtful if even they realize the magnitude of the contribution that this freight service is making to the nation's war effort. For this reason, a few figures may be illuminating.

Let us compare the year ending March 31, 1943, the latest for which figures are available, with that ending three years earlier. In this most recent year the railways produced 103.3 per cent more ton miles of freight service than in the year ending March 31, 1940. And they did this while handling 170 per cent more passenger miles. Furthermore, this doubling (and more) of railway service was accomplished with nearly 2 per cent *less* freight locomotives available and only 9.4 *more* freight cars on line.

This remarkable record of service to the nation was made possible in part by the reduction to an all-time low record of the number of locomotives and cars awaiting repair. In these three years, the number of "bad order" road freight locomotives was reduced 54.5 per cent; the corresponding reduction in "bad order" freight cars was 70 per cent. This increased the equipment available for service by 3,140 locomotives and 111,276 cars. Likewise, the number of *surplus* locomotives and cars was so drawn down that 87 per cent of the freight locomotives and 95 per cent of the freight cars were in active service on March 1, 1943, as compared with only 66.3 per cent of the locomotives and 84 per cent of the freight cars three years earlier.

When to this achievement in maximum availability of equipment are added the increases made in average loading of cars, and in miles per car per day through reductions in dead time in terminals and in shippers' hands, one can realize how it was possible for the railways to move 66 per cent more freight in the year ending on March 31, 1943, than under government operation in 1918, and 51 per cent more than in 1929, the record-year prior to the present peak movement.

And this record of traffic movement is no less an achievement of maintenance of way than of transportation or mechanical forces for no railway service can be better than the tracks and structures over which it moves and the responsibility rests on roadway forces to make good the wear and tear of this record traffic—and to do this in the face of acute shortages of labor and materials.

It is in recognition of this effort that Joseph B. Eastman, director of the Office of Defense Transportation says "Well done," to railway men in acknowledgment of their effective devotion to their work during the past year. In similar vein, Major-General Charles P. Gross, chief of transportation, United States Army, states that "the confidence of the men of the Army in the ability of railway men to meet the test has not been misplaced." And Rear Admiral William Brent Young, chief of the Bureau of Supplies and Accounts of the United States Navy, writes that "the efficiency and dispatch of our railroads in serving the Navy must be recognized as among the greatest accomplishments in the prosecution of the war."

Truly, the railways are a very effective arm of the nation in its war effort. Equally true, every railway employee—every maintenance employee—has a very direct part in this effort.

Rail—

Must Not Let Shortage Threaten Safety

Lack of adequate manpower has come to be the No. 1 problem of the railways as a whole, and was so rated by Joseph B. Eastman, director of the Office of Defense Transportation on May 7 when he appeared before the House Military Affairs Committee during hearings on pending legislation affecting the manpower situation. However, a close runner-up, if not the No. 1 maintenance problem on many railways, and on specific sections of practically all roads, is the shortage of rail. Recently, Ralph Budd, president of the Burlington system, said that the railroads are now at the point where they need "three things vitally," and the first of them is track rail. Others have said the same. At any rate, whether the No. 1 or No. 2 problem, the rail situation is growing so serious that it is important that every maintenance officer know what is in prospect so he can plan on the basis of that prospect. The current rail situation and the immediate prospects, as outlined in an article in the May 22, Annual Freight Progress issue of the Railway Age, are as follows:

"For 1943 replacements, the railways estimated their requirements at 1,875,000 gross tons (2,100,000 net tons). In its desire to be ultra-conservative in the face of other essential needs for steel, the Office of Defense Transportation, acting for the railways, requested from the War Production Board only 1,607,142 gross tons of rail for the year (1,800,000 net tons), which, in equal installments, would have allowed 401,785 gross tons (450,000 net tons) in each of the four quarters of the year. However, it urged that the preponderance of the rail be made available in the first three quarters of the year to permit better laying and servicing conditions than might be possible late in the year, at least on roads in the North. In recognition of this latter plea, the WPB at first authorized the rolling for delivery in the first quarter of the year of 428,571 gross tons (480,000 net tons), which raised hopes among maintenance men that with comparable allowances in the second and third quarters, they would receive their essential needs for the year as a whole. But these hopes were short lived when the first quarter allotment was subsequently cut to approximately 357,443 gross tons (400,000 net tons), and were shattered when the WPB authorized for rolling for delivery in the second quarter only 312,500 gross tons (350,000 net tons), in spite of protestations on the part of the railroads.

In the light of the request of the roads for a minimum of 1,800,000 net tons of rail during 1943—equivalent to 450,000 net tons in each quarter—and the failure to allot them one-half of this amount in the first half of the year by 150,000 net tons, the ODT, acting as claimant agency for the railways, urged that the railways be allowed a total of 600,000 net tons of rail in the third quarter of the year to bring 1943 deliveries to the end of the third quarter into step with requirements, but it is understood that only approximately 375,000 net tons will be rolled during the third quarter."

Continuing, the article points out that, if the railways were to be allowed to receive and lay their essential requirements of 1,800,000 net tons of rail in 1943, they should have had more than the 600,000 net tons requested for the third quarter, because of the importance of getting all 1943 rail into track and surfaced carefully before winter conditions set in.

The foregoing facts can mean only one thing to practically every roadmaster and track supervisor, as well as to hundreds of track foremen—that during 1943 he is certain to get less rail than he feels is essential for the proper and safe upkeep of his track. In turn, they portend new and added responsibilities for each of these men—the responsibility to see that, through every available means, the service life of his present rail is extended as far as possible, the responsibility to see that every ton of new rail that is made available is laid properly and where it is most urgently required; and the responsibility to insure that, through diligence in inspection, rail failures, which are certain to occur with increasing frequency as the life of the rail is stretched beyond its normal life, will be detected before accidents occur.

While these men on the ground have just cause for concern with the rail situation that faces them, that concern, rather than becoming the cause for dismay, should present them with a challenge—a challenge to make certain that, in the interest of the nation's war effort, the rail situation, insofar as is humanly possible, shall not cripple rail transportation. It is in rising to challenges such as this that it can be said, as has already been said repeatedly, that track maintenance men are rendering a service to their country as great and as indispensable as though they were in the armed services.

Labor Situation—

Some Favorable Factors in Sight, But—

Among the many problems confronting maintenance officers in their effort to meet the exacting demands of war traffic on their tracks and structures, and in spite of the seriousness of certain phases of the material situation, the shortage of track labor is, undoubtedly, their No. 1 concern. Already short of adequate forces last summer and fall, the shortage has become increasingly acute since the opening of the current working season, ranging anywhere from 10 to 50 per cent and more in specific gangs or territories, and, not infrequently, with the greatest shortages in those areas where labor is needed most vitally.

This situation was commented upon in our May issue, and is commented upon again in this issue at some length in the article entitled Labor—The No. 1 Problem of the Maintenance Officer in 1943, reporting the discussion at a "round-table" on the labor situation at the Annual meeting of the Maintenance of Way Club of Chicago on April 26. Changing almost daily, for better or for worse, still further comments will be required from time to time to keep abreast of developments. Even since the meeting referred to, there have been developments which may have an important influence on the labor situation. In fact, some of them are already influencing the situation materially. On the unfavorable side, the most serious recent factors are the determination of Selective Service to continue to draw men from essential industries, including key men, who heretofore have been granted temporary deferments; and the increasing competition of ag-

riculture in the labor market for all available manpower, from 16 to 60 and over.

These factors will have a distinctly unfavorable effect on the track labor situation, but fortunately, there are other developments that are already having a favorable effect and which, carried beyond present limits, could have a profoundly favorable effect. One of these factors is the recent agreement between the United States and Mexico, permitting the importation of 6,000 unskilled Mexican workers for work on the railroads in the Southwest and Pacific Coast, which, on May 20, Joseph B. Eastman, director of the Office of Defense Transportation, hailed as a definite step in easing the serious shortage of track labor on these roads. Under this agreement, the first contingent of workers arrived in the United States on May 11, and the remainder are to be brought in at the rate of 1500 a week until the quota of 6,000 has been reached. And beyond this, Mr. Eastman has explained, the quota may be extended if added track labor is found to be necessary, which it unquestionably will.

Added to this development is the importation of several thousand workers from Mexico and Jamaica for employment on farms, which, while not affecting the railroads directly, cannot but help improve their labor situation to the extent that any factor which relieves the labor situation in an industry competing for labor, relieves the strain on the general labor market from which the railways must draw. Another development on the favorable side is the recent halt called by the government to a large part of its war industry construction program, shifting emphasis now to production in plants already built. This, combined with the fact that production is or will be carried on largely by women in many of these plants, will throw large numbers of men again into the labor market.

Still another factor with favorable possibilities limited only by the extent to which advantage is taken of it, is the British and American victory in Tunisia, resulting in the capture of more than 270,000 able-bodied Germans and Italians, many of whom, it is reported, are glad to be out of the war, and look forward to prison camps and work in the United States. That thousands of these prisoners will be brought to the United States has already been announced by Secretary of War Henry L. Stimson, who, on May 20, disclosed that prison camps have already been established in the United States in sufficient numbers to care for all of those Axis prisoners captured in North Africa that are to be brought to this country. Continuing, Mr. Stimson said that plans for the disposition of prisoners and their use for farm work, as well as for other types of work permissible under the articles of the Geneva Convention, are being studied by the War department.

It was disclosed recently by army officials that a considerable number of Italian prisoners of war are already in the United States, and that they are being made available for farm work in Indiana. Further confirmation of this fact has been disclosed by the floods in the Middle West, where it has been reported that prisoners have been utilized for emergency flood control work along the Mississippi river and at other points.

Beyond question, thousands more Axis prisoners will be quartered and given a chance to work in the United States. Whether prisoners will be employed in actual railroad construction and maintenance, as was done on a large scale in England, France, Russia, Italy and Canada during World War I, is, for the moment, beside the point. The very fact that the farm labor situation will be eased by the employment of Axis prisoners is certain to ease the normal labor market from which the railways must now seek their forces.

These are all hopeful signs, but until the railway labor situation is definitely relieved, no effort should be spared on the part of railway officers to hold their present forces, and to seek such native labor as becomes available with rises in the labor market in any part of the country.

Tie Scarcity—

Demands Discrimination in Renewals

FOR many years there has been a perennial dispute as to whether tie renewals should be made by the group or the spot method. The question has never been settled, for each of the contenders has retained the conviction that his method is superior. A few have taken the middle course and maintain that under certain conditions spot renewals should be made, while under other conditions the group method is the one to follow. One of the reasons for this difference of opinion is that both methods have disadvantages. Another is that some roads are getting longer service life from their ties than others are for, obviously, as tie life is increased, the desirability of employing the group method of removal is decreased, while the opposite is true when tie life is decreased.

For the time being, this dispute has been settled, in part at least, whatever the merits of the opposing views may be, by the economic and manpower conditions growing out of the war, whereby tie production has been curtailed sharply. In addition, the tie stocks in the hands of producers have been depleted by requirements for a large mileage of tracks to serve war industries, cantonments and other military centers. The net results are that the supply of ties for current renewals is below requirements and prospects for next year are causing concern.

Experience has shown that when track is being given a general surface, particularly if new ballast is being applied in quantity, it is economical to renew ties liberally, removing all ties that will not last longer than two years. Yet, in view of the present and prospective scarcity of ties, it becomes a necessity to avoid the removal of a tie that retains as much as one year of service life. This means, therefore, that the group method of renewal must be given up for the present in favor of the spot method, in order to stretch the available supply so that it will be of maximum overall benefit, and that even the spot method must be applied with the utmost discrimination to insure that no ties are wasted.

In many instances, this may be the reverse of economical practice, as economy is calculated under normal conditions, but conditions are not now normal, and economy must be given a new meaning, with the result that, temporarily, maximum economy may be obtained through increased emphasis on the conservation of materials, coupled with larger expenditures, rather than in minimum over-all cost. It should not be overlooked, however, that this practice cannot be made permanent, for one cannot long continue to accumulate a deficiency in ties and maintain track in either good-riding or safe condition.

Labor—
The No. 1 Problem
of the Maintenance Officer in 1943

Labor for Victory

No. 2 of a Series

This is an abstract of a round-table discussion by seven* engineering, operating and maintenance officers on the shortage of maintenance labor and the methods and expedients used by various railways radiating from Chicago to maintain an adequate supply or to offset existing shortages. The discussion, which was in the form of questions and answers, was presented by the Maintenance of Way Club of Chicago on April 26 and was conducted by Elmer T. Howson, chairman of the club's Program committee and editor of *Railway Engineering and Maintenance*

MR. HOWSON—The topic for discussion, Labor—the No. 1 Problem of the Maintenance Officer in 1943, has so many ramifications and so many expedients are being tried by various railways in attempts to solve this problem, that a group of speakers has been assembled, each with particular experience in one or more phases of this problem. The program will be presented in the form of questions and answers. The territory in which we are to consider this problem will be confined to the central portion of the United States, roughly between the Alleghany and the Rocky Mountains. We will first review the situation as it exists in this area so that we will have a clear idea of the problem before we discuss what is being done by the railways to solve it.

Conditions in the Labor Market

Mr. Howson—Mr. Grove, what are the conditions with respect to maintenance labor on the railways to the east of Chicago?

Mr. Grove—In the territory from Chicago east to Detroit, Mich., and Crestline, Ohio, and roughly south to the Ohio river, we have depended principally on local labor for extra gangs and, of course, for section labor. We now have two large extra gangs working in this territory engaged in laying rail. We are having the most difficulty in keeping a sufficient number of maintenance laborers in terminals and also in the vicinity of defense industries. Keeping the gangs filled has taxed the ingenuity of division officers because the problem of labor supply on the Pennsylvania has been largely left to them.

***Armstrong Chinn,**
General Manager, Alton

C. M. Chumley,
Engineer Maintenance of Way, Illinois Central

H. R. Clarke
Chief Engineer, Chicago, Burlington & Quincy

C. G. Grove,
Chief Engineer Maintenance of Way Western Region, Pennsylvania

C. H. Hardwick,
Engineer Maintenance of Way, Chicago, Rock Island & Pacific

W. G. Powrie,
Engineer Maintenance of Way, Chicago, Milwaukee, St. Paul & Pacific

E. C. Vandenburgh,
Engineer of Maintenance, Chicago & North Western

Mr. Howson—Mr. Vandenburgh, what are the conditions on the railways radiating west of Chicago?

Mr. Vandenburgh—I have just completed a three weeks inspection of our lines in Illinois, Iowa, Nebraska, South Dakota, Minnesota, and Wisconsin. The situation with regard to section labor is not bad in Iowa, Nebraska and South Dakota, for most of our section gangs in this territory are filled to approximately 80 per cent of the force required. Some of our roadmasters in these states report they can get more men than they are allowed, while others are barely getting by. In Northern Illinois and Southern Wisconsin, however, conditions are much different. In this area, we are faced with the competition of higher pay in government plants and also in private industries engaged in war work. The labor situation in this area is very tight, particularly between Chicago and

Milwaukee, Wis., and in Southern Wisconsin.

The extra gang labor situation is definitely bad in all areas. Normally we recruit some medium-size gangs from local labor, but we are now obtaining from this source only about 10 per cent of the force available in previous years. Labor secured from agencies in Chicago is becoming very scarce and, in large measure due to this scarcity, the quality is not as good as in former years.

It is evident that our situation will get much worse as more men are diverted by the draft, by war industries and by the campaign for farm labor. Farm wages have increased and other factors, such as board and lodging and draft exemption, make this work more attractive than formerly. In the farm areas west and northwest of Chicago, conditions will be much worse in the harvest season. For this reason, the roads in the agricultural areas should get as much of their work done as soon as possible before July.

Mr. Howson—Mr. Chumley, what are the existing conditions in the territory south of Chicago?

Mr. Chumley—Ordinarily, more labor is available in our southern territory than in the north, but we are now facing shortages of labor all over our lines, although these shortages are confined mostly to populated centers and localities near munitions plants. On the southern part of our system, we have depended mostly on colored labor. Because a large proportion of the colored labor available in this area is of a roving type, and because the general wage scale is lower in the South, much labor that is normally available in this area has left the railway to seek higher wages elsewhere. Although we are, therefore, facing a shortage of labor, it is not yet as severe south of the Ohio river as north of that point.

Lengthening the Working Day

Mr. Howson—Now that we have some idea of the conditions existing east, west and south of Chicago, the question arises, what are the railways doing and what can they do to meet these conditions? One of the methods employed to counteract the labor shortage has been the lengthening of the working day. Mr. Clarke, what has the Burlington been doing in this respect?

Mr. Clarke—The problem of labor has not been overdrawn, and many expedients have been tried with varying success. The railroads are competing with higher wage rates in other industries and have even reached the point of competing with each other for the limited labor supply that is still available. With such conditions, assuming the wage rates are the same, the road that offers the most attractive inducements will get the most labor, although many men in the labor pool prefer to work on certain railroads on which they have worked before. Such men will remain on the road they prefer, or return to that road, if conditions are equal to or as attractive as those on other competing roads.

In considering the problem of lengthening the working day, we find that some gangs and some types of workers prefer to work a longer day, while other gangs and men engaged in other types of work prefer to work only the standard eight-hour day. In general, those men that work away from home for long periods of time and are housed in outfit cars, such as extra gang laborers, bridge and building men, signal construction men, track welders, etc., are glad to and even prefer to work longer hours for the extra pay. On the other hand, we find that section men and men working around terminals who live in their own homes, have other things to do when the working day is over, and do not prefer to work more than eight hours.

The demand for a longer work day originated first in the larger labor centers and around terminals to offset the shortage of labor that appeared first in these localities. A study was made to determine what affect a longer work day would have in the output of the gangs and our forces were canvassed concerning their willingness to work 9 or 10 hours per day. In general, the maintenance supervisory officers stated that longer working hours would result in increased production from the gangs during cool weather and many of the men expressed willingness to work 10 hours. It was decided, as the result of this study, that the gangs would be requested to work 9 or 10 hours, but that this length of working day would not be made compulsory, and that those gangs that wished to do so, could continue to work 8 hours, if they desired. The results from increasing the length of the working day have been favorable. We have obtained increased production from the men available and these men have

Right—A Gang of Negro Women Renewing Ties in a Yard Track in Chicago. Below—A Gang of Women Working on the Southern Pacific Near Eugene, Ore.

earned more money, which has helped to keep them on the railroad, instead of their being attracted elsewhere for higher wages. So far, we feel that the decision to increase the working day was a wise one.

Mr. Howson—Mr. Chinn, what is your feeling about the lengthening of the working day as a means of holding and attracting labor?

Mr. Chinn—Mr. Clarke pointed out that the railroads are having difficulty securing labor because of the wage differential that exists between maintenance of way labor and that employed in government plants and private industries. This is very true. For example, we are competing with rates for labor in the vicinity of ordnance plants which range from 50 to 150 per cent more than usually paid track labor. The railroads are handicapped particularly because they operate under rate schedules based on union agreements, and these rates can not be altered without new agreements.

The only way to get around this difficulty is to work the men more hours per day so that their total weekly earnings will approximate what they could have earned in a war plant working 40 hours per week. Another problem is the competition between railroads drawing their labor from the same source. Any advantage offered by one road must be met by the others if they are to get their fair share of the labor.

Clean, Comfortable Camp Cars and Good Food Are Essential to Attract and Hold Extra Gang Laborers

Employing Boys Below Draft Age

Mr. Howson—A method of securing additional labor, which has been tried on some roads, is the employment of boys 16 and 17 years of age. Mr. Powrie, what has been the experience of the Milwaukee in this practice?

Mr. Powrie—The labor situation on the Milwaukee is similar to that described on other roads. From the standpoint of the total number of section laborers working at the present time, it would appear that we have an adequate supply of labor, but, unfortunately, we have some sections where we have had no labor for some time. Referring specifically to the employment of boys below the draft age to augment the section forces, some states have child labor laws which restrict or limit the employment of minors. In Wisconsin, for example, where the law prohibits the employment of boys under 18 years of age on track maintenance work, we have asked the state authorities for permission to employ 16 and 17 year old boys, with the result that a special order has been issued by the State Industrial Commission authorizing such employment.

We have also asked our supervisors to call at local high schools to solicit boys for part time work. We have told the school authorities that we would employ these boys locally full time during their summer vacations, or if they were willing to go away from home would provide camps for boys only. We have offered to employ the school coach to help supervise the boys in these camps. As a result of our effort, we now have several hundred high school boys on our lists and are employing a considerable number of them in both construction and maintenance work. These boys are not quite as efficient as our experienced older men, but they are working very well and we expect to expand this practice.

Mr. Howson—Many railroads have been employing over-age men for some time and have raised their upper age for new employees. Mr. Hardwick, what has been your experience on the Rock Island with this expedient?

Mr. Hardwick—We have raised our age limit reluctantly. This was first done about a year ago when we raised the limit from 45 to 55 and we got considerable numbers of men as a result. Again, later in the year, we raised the age limit to 60, and this helped, particularly in areas where younger men have gone to jobs in defense industries. By this means we have gradually been able to add some additional men to some of our gangs. These older men are not nearly as efficient as the younger men and we have tried to avoid hiring any more of them than we absolutely need.

Maintaining Large Forces in Winter

Mr. Howson—Some roads anticipated last fall that the shortage of labor would continue to get worse, and maintained full or nearly full forces throughout the winter. Mr. Vandenburgh, what did the North Western do in maintaining forces of larger than normal strength during the past winter?

Mr. Vandenburgh — We worked larger forces of track men than usual during the past winter. Our winter forces in our section gangs were held at 25 to 30 per cent above normal. We thought we could get efficient work from these men regardless of the weather handicap and we did accomplish a lot. Most of these men were regular section men with considerable seniority and by holding them through the winter, we lost only a few, although, more recently, a few more have left for farm work. In general, men with seniority who were laid off have usually returned when they were called although we have had some difficulty getting men to return who went to work in war industries after they were laid off in the winter. Lately, when we attempted to get these men back, some of these industries have refused to release them and have informed us that these men are now "frozen" in their present jobs. However, in some instances we have appealed for help to government agencies and hope that we will get some of these men back.

Employment of Women

Mr. Howson — There has been much publicity during the past year about the employment of women in government plants and in private war industries. More recently, the railways have employed increasing numbers of women. Mr. Grove, what has been the Pennsylvania's experience with the employment of women in maintenance work?

Mr. Grove—Last winter we maintained heavier maintenance forces than normal for the winter season. In order to keep our forces up to the strength desired, we added women in some cases, although not many. They were employed chiefly in terminals

and were assigned types of work that they could do. Ordinarily we use 6, 8, or 10 women in a gang along with 3 or 4 men and 1 foreman. The work has been organized so that the men do the heavier work. For example, in putting in ties, the women do the tamping and dressing. We have also used women in the motor car repair department and around enginehouses. In general, they are 40 to 50 per cent as efficient as men. We pay them the same wage as the men, however, and furnish portable toilets for the gangs which have women employees. Our experience with gangs employing women has been varied. On some gangs they have stayed and become quite efficient, and on other gangs the women have quit after a short while.

Mr. Howson—Mr. Chumley, what has been the experience of the Illinois Central with the employment of women in maintenance work?

Mr. Chumley—We did not begin to employ women until about 45 days ago, therefore, our experience has been very limited; as a result we do not yet know how they will work out. The mechanical department of our road has used them for some time and has been well satisfied with them for certain types of work. Based on the experience of this department, we decided to use women in the larger terminals where we have a great variety of work and can assign them to work that they can do. At the present time, we are employing about 75 in our Chicago terminal on such work as cleaning and policing right of way, and dressing and stripping ballast.

In New Orleans we recently built a new classification yard in which the tracks were raised on 10 in. of sand ballast and than raised 6 or 8 in. more on cinders. At this location we had a shortage of labor and used colored women to unload the cinders, jack up the track, use a level board and for tamping. The women in this gang have done very well in this work.

There is always some work that women can do fairly well that would otherwise require the time of an able-bodied man. By careful selection, good supervision and proper training, we believe that one can accomplish quite a bit with women employees in maintenance work.

Using American-Born Jap Labor

Mr. Howson—We have seen quite a bit of discussion in the newspapers lately about the use of American-born Japs. Mr. Powrie, what has been your experience with the employment of American-born Japanese?

Mr. Powrie—When the Milwaukee built its line to the west coast a number of years ago, we used a number of Japanese laborers and many of these men remained in our employ after the line was completed. They were good laborers and caused us no special problems, as a result of which, we have given consideration to the employment, in the same general area, of some of the American-born Japanese now in relocation centers. We felt that, barring public sentiment against this, it might be possible to secure considerable effective work from them. We found that we could employ such Japs by going to the relocation centers and working out arrangements with the individuals, after which release papers had to be requested. All requests are investigated by the proper authorities and, if approved, and assurance is given by state and local officials that they won't be molested, the men are released for employment.

We thought of using these men in the Rocky Mountain areas away from centers of population. We started negotiating for some of these men last November, and to date have 32 working. Because of the details involved in procuring them and other problems in connection with their employment, we have not been able to secure as many of them as we had anticipated, or would still like to have. Barring public sentiment, we could work many more of them if they could be secured. However, I would hesitate to recommend their use in heavily populated areas because of possible trouble.

A Gang of High School Boys Employed in the Building of a New Eastbound Main Track on the Milwaukee Near Red Wing, Minn.

Improvement in Camps—Outfit Cars

Mr. Howson—In order to offset the shortage of labor, a number of roads have made improvements in their camp facilities for housing labor. I understand that the Pennsylvania has built many camp cars. Mr. Grove, can you tell us more about what the Pennsylvania has done in these matters?

Mr. Grove—The Pennsylvania has built a lot of camp equipment during the past year. We formerly converted numbers of wooden passenger coaches to outfit cars for extra gangs. There are a number of disadvantages in the use of this type of equipment and in recent years we have built outfit cars with a standard box car underframe. This type of car can be used with gangs of varying sizes and can be moved in road movement without trouble. It is more or less similar to the standard type of converted box car that is used for outfit cars on other roads. These cars have sleeping quarters for 10 men, with shower baths and toilet facilities; other cars are equipped as full diners, kitchens, etc. We tried to estimate how many outfit cars we would need this year for gangs varying in size from 6 men to 10, 20, 30, 40, 50, and on up, excepting for our large rail laying gangs. We do not board the men that use our outfit cars. They usually work out their own arrangements. The cars have helped to bring labor to locations where shortages were acute, and have worked out very well, although when pay day comes we invariably lose some men. At some terminals, we have camps housed in company buildings which have been converted for that purpose to care for 20, 30 or 40 men.

Recruiting Labor from Remote Areas

Mr. Howson—Some roads have been recruiting labor from areas in which there are still some surplus workers available. In many cases this recruiting has been carried on many miles from the territories served by the railroad. Mr. Grove, what has been your experience with such recruiting?

Mr. Grove—Until this year we have secured all our labor locally.

(Continued on page 446)

D. & H. Lowers Rock Floor 2 Ft.

THE Delaware & Hudson has brought to a successful conclusion the difficult and complicated task of lowering the grade in a 2,240-ft. single-track tunnel in which the floor is of solid rock. Although the work had to be done under traffic and entailed the cutting down of the rock subgrade as much as 4 ft., it was performed expeditiously and economically by lowering the grade in successive overlapping "cuts" or runoffs, working both ways from the summit. As part of the project, the side walls were underpinned with concrete and a subdrainage system was installed to handle seepage water.

The Situation

The tunnel in which this work was carried out is located on the Susquehanna division of the D. & H. about 16 miles north of Binghamton, N. Y., and is known simply as the Tunnel. Built in 1868, this single-track bore is about 2,240 ft. long and has stone masonry bench walls and a brick arch, over most of which a coating of Gunite has been applied. From both directions the track in the tunnel ascends on variable grades to a summit at about its midpoint, the maximum grade from the south being about 1.18 per cent and that from the north being about 0.58 per cent. Prior to the recent work, there were 3 in. to 6 in. of ballast under the ties throughout most of the tunnel, although at certain locations, due to irregularities in the subgrade, the ties rested directly on the rock floor or were even embedded in it.

Since the vertical clearance in the tunnel was inadequate to permit it to accommodate the larger units of motive power in use on the road, it was decided two years ago to remedy this situation by lowering the tunnel floor as necessary to provide the desired clearance. Specifically, the plan was to increase the vertical clearance two feet at the minimum cross-section. At the same time it was planned to replace the existing 90-lb. rail with 131-lb. rail, and to place ballast under the ties to a uniform depth of 5 in. Because of the irregularity of the profile, the extent to which it was necessary to cut down the rock floor was generally somewhat more than two feet. Actually, it was as much as 4 feet at certain points in the tunnel.

Other Work Required

In conjunction with the work of lowering the floor of the tunnel, it was necessary to give consideration to several other factors. In the first place, it was apparent that it would be necessary to underpin the side walls. Also, it was desired to make provision for disposing of a considerable amount of seepage water that was finding its way into the tunnel. Previously, this water, flowing in the side ditches, had given considerable trouble during cold weather, particularly at the north portal where it would freeze on reaching the open atmosphere, thereby tending to block the side ditches. To overcome this difficulty, it was decided, in conjunction with the other work, to install a subdrainage system throughout the length of the tunnel, this system to consist of a line of 10-in. perforated, corrugated pipe placed in each side ditch in a trench back-filled with crushed stone.

Preliminary Work

When undertaking this project, the first step was to project the new grade lines for the top of rail and the top of rock. Another preliminary step was to establish a line of bench marks at 50-ft. intervals throughout the length of the tunnel. These were in the form of wooden pegs driven into holes in one of the side walls, and were so positioned that they were all at the same elevation relative to the proposed grade lines of the top of rock, the top of rail, and the inverts of the drain pipes. The presence of these bench marks, with cord stretched

Recently the Delaware & Hudson found it necessary to increase the clearance substantially in a long single-track tunnel so that larger locomotives could be operated through it. To accomplish this, the floor of the tunnel, consisting of solid rock, was cut down under traffic, using an ingenious system of progressive runoffs. The method used, as well as other interesting phases of the work, is described in this article

View at the Left—Shows One of the Gangs at Work Cutting Down the Floor of the Tunnel

in 2240-Ft. Tunnel

between them, and the use of wood templates, made it possible to keep a constant check on the work of establishing the various new grade lines.

Underpinning Done First

The procedure that was followed in carrying out this project was first to complete in its entirety the underpinning of the bench walls and the placing of the drainage system, this work being undertaken in November, 1941, and completed during the spring of 1942. In underpinning the bench walls, the rock formation under them, consisting of a shale that is inclined to weather when exposed to the atmosphere, was cut out to a depth of about 3 ft. below the new top of rail and replaced with mass concrete. This underpinning is about 2 ft. 4 in. thick at the top and spreads out to a thickness of about 2 ft. 8 in. at the bottom.

At the top of the underpining it is so constructed as to form a shelf extending out 4 in. from the face of the tunnel wall. This feature not only facilitated the pouring of the concrete, but it also provides a support for use in the event that it might be necessary in the future to install a lining in the tunnel. To permit the escape of seepage water, 6-in. round weep holes were provided in the underpinning at intervals of 10 ft. In placing the concrete, it was poured solid against, the face of the rock formation except that vertical drains were provided behind the underpining at the weep holes, consisting of rock-filled recesses cut in the rock. These are six inches square in cross-section and extend the full height of the underpinning.

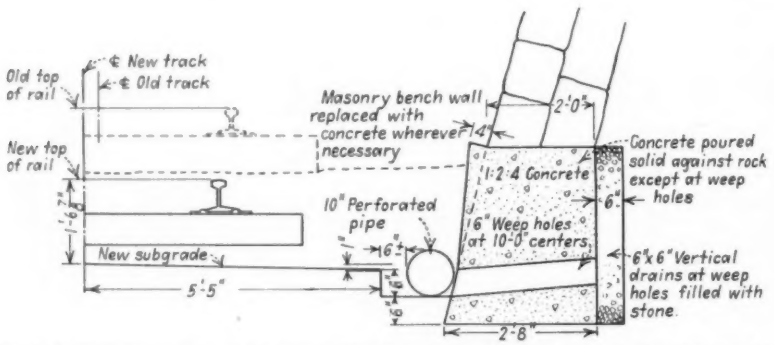
To receive the 10-in. perforated drain pipe, a shallow trench was cut in the floor of the tunnel along the face of the underpinning at each side of the tunnel. The flow lines of these trenches are six inches below the rock floor (subgrade) of the tunnel, as lowered, and are the same distance above the base of the underpinning, the weep holes in the latter being so positioned that they emerge at the level of the drain pipes.

The work of installing the underpinning and placing the drain pipes was performed by two bridge and building gangs, starting at the opposite ends of the tunnel and progressing toward the middle. In placing the underpinning it was, of course, necessary to proceed with extreme care to the end that the side walls would be adequately supported at all times, not only to carry the direct load but also to withstand the vibration produced during the movement of heavy trains through the tunnel. For this reason the installation of the underpinning was carried out in short sections, generally about 8 ft. in length, which, as a safety measure, were placed alternately along each side of the tunnel. That is, when a par-

Immediate Right—Showing How Wood Templates Were Used To Check the Elevation and Cross Level of the Track. Extreme Right—The Tunnel Floor in the Foreground Has been Lowered to Final Elevation

ticular section had been completed, the work was advanced to the second section forward instead of that adjacent to the one just finished, the purpose being to give the concrete time to set before cutting the supporting rock from under adjacent sections of the wall, and also to avoid interference between the different phases of the work. When working on any individual section of the underpinning, the bench wall above it was supported by lengths of scrap rail placed longitudinally, with their ends resting in niches cut in the rock at the ends of the section.

The work of digging the trenches for the drain pipes and of undercutting the bench walls was done with pneumatic concrete breakers supplied with air from a three-inch line extending to a compressor set up at each end of the tunnel, this line and the compressors later being used in the work of cutting down the tunnel floor. Concrete for the underpinning was mixed at a small plant at each end of the tunnel and hauled to the site of the work in two-wheel buggies carried on push cars. For this work special push cars, 12 ft. long, mounted on two four-wheel trucks, were used, each of which was capable of holding three of the buggies. Two of the push cars were used by each gang, and heavy-duty section motor cars were employed for hauling them.



Typical Half Section in the Tunnel, Showing the Underpinning and the Relationship of the Old and New Grades

Lowering the Floor

The work of lowering the floor of the tunnel to the new grade line was by far the most difficult and complicated phase of the project. It was made so by several circumstances, including the considerable depth of the cut required, the fact that it had to be made in solid rock, and the further fact that it was necessary to perform the work under traffic. When plans were being made for doing this phase of the work, a number of different methods were proposed and considered, most of which were found to be impractical for one reason or another. It was finally decided that the best way to do the job would be to cut down the floor to its final elevation by means of a series of successive overlapping run-offs in which, at any given time, the rear end of the runoff would be at the new grade while the forward end would be at the old grade.

A basic feature of this idea was that the direction of progress be down grade so that the grade of the runoff would be opposite to, and, hence, would subtract from, rather than augment, the existing grade of the track. Pursuant to this requirement, the work of lowering the track was started at the summit of the grade in the tunnel, being performed by two gangs which progressed towards the opposite portals. For doing this work the same two gangs, each containing 10 to 15 men, were used that had previously carried out the underpinning and subdrainage work. As a preparatory step, the ties in the tunnel were renewed out-of-face with sawn ties in order to have the advantage of the square ends later on when it would be necessary to introduce struts between the ties and the side walls to support the track laterally after the ballast had been skeletonized.

Details of Cutting Method

As the initial phase of the grade-reduction work, a short section of the track at the summit was cut down to the new elevation, using suitable run-offs, to provide a starting place for the two gangs, which worked competitively in opposite directions. After this, the work of bringing the track down to the new grade became merely a matter of repeating a certain cycle of operations involved in carrying the runoffs forward. At the beginning of each cycle the track within the limits of the runoff was in a skeletonized condition, with the ties resting directly on the rock floor and with wood struts in position between the ties and the side walls to hold the track laterally. At the rear end of the runoff the floor had been reduced to its final elevation, while at the forward end the track was at the original grade. In preparation for the next step, wood blocking, consisting of short pieces of ties and 10-in. by 10-in. timbers, was inserted under the rails between the ties to carry the weight of the track. In conjunction with the blocking, hardwood car shims were used which were nailed to the blocking after being driven in position under the rails. In realization of the serious consequences of a derailment in a single-track tunnel, extreme care was used at all times when installing the blocking and the lateral struts, with the result that the work was carried out with a complete absence of accidents of any kind.

With the blocking in place, the track was in readiness to permit the work of cutting down the rock floor to be undertaken, this work being started at the rear end of the runoff and carried forward progressively. The cutting was done with pneumatic concrete breakers, and while it was under way the ties and the blocking were shifted about as necessary. Normally, the depth of the cut made in the floor in each runoff was about 8 in., suitably graduated at the ends to meet the new and old grades. As the cutting proceeded, additional blocking was added to that already in place so that the original grade of the runoff was not disturbed during this phase of the cycle. Incidentally, the work of cutting down the floor was facilitated somewhat by the fact that the shale formation had a laminated structure, causing it to break out easily in flat pieces, which were sometimes of considerable size.

Lowering the Track

When the rock surface had been cut down the desired amount throughout the length of the runoff, the next step was to lower the track to this new, but for the most part temporary, grade. This was done in short sections by first transferring the load of the track to a pair of jacks, placed opposite each other, then removing the blocking in the vicinity of the jacks, and, finally dropping the track by releasing the jacks. The latter were then moved forward about a half rail length to repeat the procedure, this being continued until all the blocking had been removed. Generally speaking, the amount of track on blocking at any given time was about 5½ or 6 rail lengths. With the removal of the blocking, a full cycle of the lowering operation had been completed and the gang was ready to

start the next cycle of operations.

In cutting down the floor in each cycle, a length of the rock surface at the rear end of the runoff, generally 50 ft. to 75 ft. long, was brought down to the final grade. When starting the next cycle, an approximately equivalent amount of track at the forward end of the runoff was skeletonized and blocked up, thereby progressing the runoff a short distance ahead. It is thus apparent how the floor was cut down as much as four feet in a progressive operation that moved forward as well as downward, and in which the amount that the track was dropped at any one time was confined to about 8 in.

Each time the track on a runoff was released from the blocking, that portion at the rear end where the rock surface had been reduced to the final grade was blocked up slightly to hold it until the local section gang could apply the stone ballast. Initially, only about three inches of ballast was placed under the ties. Following the completion of the work, and after the new rail had been laid, the track was given a final raise of two inches.

To tie the new grade line in the tunnel into the existing grades of the approaches, a run-out of about 1,200 ft. was required at the south end and one of about 1,300 ft. was needed at the north end. In making the grade change at the south end it was necessary to work under traffic, but at the north end the conditions were such as to permit a line change about 500 ft. long to be built to the new grade while operating over the old line.

How Material Was Handled

Special motor-truck dump bodies mounted on push cars were used for disposing of the material that was excavated from the floor of the tunnel. Five such bodies were used, all of which had hydraulically-operated dumping mechanisms and three of which were mounted on turntables so that they could be turned in any desired direction for dumping.

Three of the dump bodies were assigned to the gang working in the southerly portion of the tunnel, one of which was mounted on a conventional push car while the other two were mounted on one of the special 12-ft. cars having two four-wheel trucks. The two remaining truck bodies, each mounted on a standard push car, were used by the other gang. These were supplemented by two of the 12-ft. cars fitted with side boards. As the material was loosened from the floor of the tunnel, it was first shoveled into the side ditches and thence loaded onto the trailers which were drawn to waste banks outside the portals by heavy-duty motor cars.

The Excavated Material Was Hauled to Waste Banks in Dump - Truck Bodies Mounted on Push Cars

A power line, attached to one of the side walls, was extended through the tunnel to light the work. Outlets were provided in the line at 25-ft. intervals so that the light bulbs could be moved forward to keep pace with the work as it progressed. Also, a supplementary lead was strung along the opposite wall at the point where each gang was working, and, in addition, portable electric flood lights, mounted on wood standards, were used to illuminate particular operations.

While the work of cutting down the floor was under way, a speed restriction of 15 miles per hour was in effect through the tunnel. During working hours each day an average of about 12 trains passed through the tunnel, of which about 5 had pusher engines. This meant that the work was also interrupted by the pusher engines when returning through the tunnel; hence, in reality, there were about 17 trains each working day.

Warning Signals

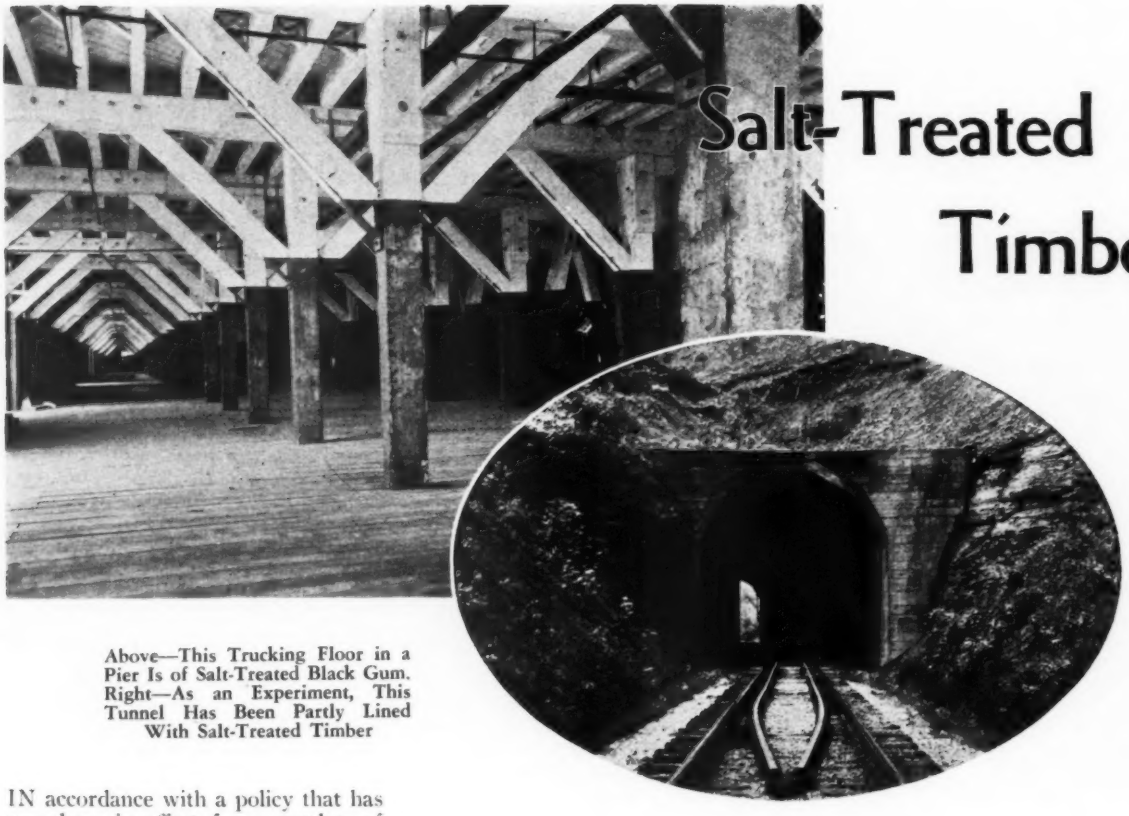
A feature of the work that was of unusual interest was the system that was used for warning the gangs of the approach of trains, which involved the use of electrically-operated horns placed at intervals in the tunnel. These horns were sounded by two flagmen, one at each portal, who were housed in small shelters and provided with telephones cut in on the dispatchers' line. To warn the gangs of the approach of a train from either direction, a long and a short blast would be sounded on the horns when the train was one station away, that is, about six miles. This advance warning would allow sufficient time in which to close up the track. Three long blasts were an indication to the men that they were to leave the tunnel immediately. When clearing the tunnel for trains, each of the two gangs would go to its respective portal, and when all the men were in the clear the procedure was for the two flagmen to check with each other. One long blast on the horns was a signal that a motor car desired to pass through the tunnel, while two long blasts were used to summon officers to answer telephone calls.

By means of wood doors at the portals of the tunnel, it was possible to close off the interior when work was under way during extremely cold weather. Not only did this contribute to the comfort of the men, but it helped to prevent the freezing of water in the tunnel, especially in the north end where considerable difficulty was experienced because of the formation of ice. Although these doors were operated manually, they were connected with the track signal system in such a manner that, if their operators should fail to open them on the approach of a train, the track signals in both directions from the tunnel would be held against trains until both doors had been opened.

By utilizing the procedure described in this article, the grade of the tunnel was lowered in about six months less time than it was expected would be required. When the grade reduction work had been completed the existing 90-lb. rail was renewed with new 131-lb. rail. previously flash butt-welded into continuous lengths, and as the last step the track was given a final raise of two inches.

The work described in this article was carried out by company forces under the general direction of P. O. Ferris, chief engineer, and under the direct supervision of R. S. Gutelius, division engineer. The removal of the rock, the installation of the underpinning and the handling of the track blocking were under the immediate supervision of John E. Doyle, bridge and building master, while all track work proper was handled by Duane Eddy, track supervisor, reporting to William Koch, roadmaster.

Salt-Treated Timber



Above—This Trucking Floor in a Pier Is of Salt-Treated Black Gum. Right—As an Experiment, This Tunnel Has Been Partly Lined With Salt-Treated Timber

IN accordance with a policy that has now been in effect for a number of years, the Chesapeake & Ohio is using salt-treated timber extensively in its routine building repair and maintenance programs, and in the construction of new buildings. In fact, the practice of using salt-treated timber is so well established on this road that it is now carried in stock in the amounts necessary to carry out programmed building work. The preservatives used are chromated zinc chloride, Wolman salts, and Celcure, and in all cases it is specified that the treatment be in accordance with Federal Specification TT-W-571b, which covers all of these preservatives.

Benefits

Through its policy of using salt-treated timber in buildings, the railroad expects to secure a substantial increase in the service life of its structures. Moreover, it has found that by treating sapwood with preservative salts, it is given a service life equal to or greater than that of the so-called durable species of heartwood, which are generally no longer available. In other words, sapwood may now be used for purposes for which only heartwood was formerly considered suitable, a fact of considerable importance in view of the growing scarcity and increasing cost of heartwood.

When the use of preservative salts was first introduced on the C. & O., the sole consideration was the desire to prolong the service life of timber applied in the repair or construction of buildings. More recently attention has been given to the fact that when timber is properly treated with preservative salts it also has definite fire-resistant qualities, and this factor is now an important consideration in the use of salt-treated timber in such buildings as engine-houses, where a fire hazard is present.

In fact, the railroad attaches particular importance to the advantages of such timber for use in engine-houses. Wood is not affected by the corrosive action of smoke from locomotive stacks, and when it is given the added qualities of resistance to decay and fire by proper preservative treatment, the reasoning is that it be-

Left Below—This View of a Shop Building Was Taken Soon After Extensive Repairs Had Been Made with Salt-Treated Timber

Used Widely on the C. & O.

comes highly adaptable for use in structures of this type where severe corrosive conditions usually exist.

What Is Treated

Practically all timber that is now used in making permanent building repairs on the C. & O., and much of that which is used in new construction, is subjected to the salt treatment, including sheathing, siding, rafters, joists, studding, flooring, decking, structural timbers, moulding, trim and some sash. A particularly large item is black gum decking for trucking platforms. Although this material has excellent wearing qualities, its service life, when untreated, is cut short by decay. Not only does the salt treatment make it possible to realize the full potential service life of the decking, but, being a "clean" treatment, it has no objectionable characteristics from the standpoint of the effect on personnel or lading. Ordinarily, it has been the practice on this road to purchase wood sash predipped in a toxic solution, but recently there has been a trend in the direction of buying the sash unglazed and then having it treated with one of the preservative salts.

Part of the Decking in this Pier Apron Is of Black Gum Treated with a Salt Preservative

The salt-treated timber is used in practically all types of railroad buildings, including freighthouses and platforms, passenger stations, enginehouses, repair shops, storehouses, piers and docks, and even board fences. In other words, it is employed in locations where it is desired to have the advantages of timber treatment but where, for any reason, the use of a clean preservative is preferred or where the desire for fire-resistant qualities is a factor. The only restriction on its application is that it is not installed in locations where it is in contact with the ground or where conditions are otherwise not suitable to its use. However, it is of interest to note that an experimental

Center Below—A Board Fence of Salt-Treated Material. Right Below—When Extensive Repairs, Including the Complete Renewal of the Siding and Most of the Decking, Were Made to this Merchandise Pier Several Years Ago, Salt-Treated Material Was Used Almost Exclusively

installation of salt-treated timber has been made in the lining of a single track tunnel to determine its suitability for this purpose.

Is Carried in Stock

In general, the practice is to acquire the salt-treated material through competitive bidding, in the amounts necessary to carry out programmed building work, and to hold it in stock until needed. Wherever practicable, the timber is preframed before treatment, but this is not considered so important in the case of yard and dimension lumber which is of such size that the treatment extends entirely through the sapwood of the individual pieces. Such timbers are simply ordered in stock sizes and are cut to length on the job. Where it is necessary that the timber be painted, the cut ends are first protected by an application of the salt preservative in concentrated form. If the material is not to be painted, an application of a brush grade of creosote is made to the cut ends. The practices followed in applying and painting the salt-treated timber are the same in every respect as those used with untreated material.

Salt-treated timber was first used by the C. & O. on a large scale in 1936, when a total of 207,608 bd. ft. was installed. This was followed by the installation of 176,175 bd. ft. in 1937; 724,335 bd. ft. in 1938; 1,115,136 bd. ft. in 1939; 900,298 bd. ft. in 1940; 489,519 bd. ft. in 1941; and 954,886 bd. ft. in 1942. A total of 1,034,074 bd. ft. is in hand or on order for programmed work this year. These figures show that, from a relatively small beginning, the consumption of salt-treated material has grown to considerable proportions. The rather sharp drop that occurred in 1941 is explained by the fact that in the previous year an extensive program had been completed involving the installation of black gum decking in the company's piers at Newport News, Va. The accompanying table shows how the yearly quantities of salt-treated timber used on the C. & O. have been divided between different species of wood.

The development of the use of these materials, with consideration for broad sources of supply, was based on the following references: Trade Standard Lumber specifications; Federal Standard specification TT-W-571b; and relative specifications for preservative treatment, such as the treatment specifications of the American Railway Engineering Association and the American Wood-Preservers' Association; reports of the AWPA Preservatives committee; specifications for fire resistance of wood of the American Society for Testing Materials; and the recent developments to conserve critical material by the Federal Specification Board through the proposed Federal Specifications for Pressure Impregnation of Structural Lumber and Timber with Fire Retarding Chemicals; and the U. S. Navy Bureau of Yards and Docks, Specifications H-8 for Fire Protective Treatment of Lumber and Timber.

Consumption of Salt-Treated Timber on the C. & O. by Species of Wood

Kind of Wood	Amounts Used—F. B. M.							
	1936	1937	1938	1939	1940	1941	1942	1943*
Pine	19,208	10,739	398,072	425,508	430,298	463,391	941,186	856,486
Black Gum	188,400	165,436	326,263	689,628	350,000	.....	.....	67,664
Beech and Hickory	.....	.....	.....	.....	120,000	.....	.....	.....
Fir	.....	.....	.....	.....	.....	27,128	.....	.....
Red Oak	.....	.....	.....	.....	.....	.....	13,700	.....
Fire Retardant Lumber—Pine	.....	.....	.....	.....	.....	.....	.....	109,924
Totals	207,608	176,175	724,335	1,115,136	900,298	489,519	954,886	1,034,074

*Figures in this column show material in hand or on order for programmed work

Labor—The No. 1 Problem

(Continued from page 439)

When our own sources began to dry up we went to the Railroad Retirement Board and secured some men from places on the Pennsylvania or from nearby areas. Later we went to the United States Employment Service. They were very co-operative and told us where men were available, but in many cases these men were located at considerable distances from the railroad, and would not leave to accept railroad employment. Lately, we have been sending scouts to points in West Virginia, Kentucky, and Tennessee and have secured some labor from localities not industrially developed.

As a matter of fact, we have secured most of our labor "catch as catch can". Each division has been responsible for doing everything possible to keep its gangs up to full force. However, when pay day comes a great many leave; although some of them come back again and bring their friends. The condition, however, is not very satisfactory and we are still looking for a source of sufficient maintenance and extra gang labor.

Discussion

Considerable discussion followed the close of the question-and-answer part of the forum. One member asked Mr. Powrie if he had had much trouble in securing the co-operation of public authorities in places where the Milwaukee employed American-born Japs, to which Mr. Powrie replied, "No, we have secured the active co-operation of the representatives of the War Relocation Authority".

The discussion then centered around the employment of part-time workers during week-ends and Mr. Howson mentioned the Southern Pacific, which, he said, "Has probably gone further in recruiting students, businessmen and teachers for week-end work and for work during holidays than any other road. This road has employed as many as 2,300 such workers for week-end work, paying the prevailing section gang rate on Saturdays, with time and one-half for any hours worked in excess of 8 hours on Saturdays, and for all hours worked on Sundays, and has already obtained more than 40,000 man-days of effective work from such employees".

The employment of women was also discussed at length and Mr. Grove was asked if the men in the gangs objected to doing the heavier work and letting the women do the lighter work for the same pay, to which he replied, "We have had no trouble; most of the men in the gangs are older men and accept the division of work cheerfully".

C. C. Pelley, track supervisor, Illinois Central at Chicago, told of his experience with women in maintenance work which showed that white women of middle age made better labor than younger white women who did not stay long, while the opposite was true with negroes for the younger colored women have stayed and the older colored women did not stay long. He added that one of the biggest problems in using women in maintenance of way work is to educate the foreman to train and work the women effectively.

Because it is essentially a finishing operation involving the placing with relative exactness of loose particles of material, the dressing or shaping of ballast is usually considered as being strictly a task for hand labor. On the Erie, however, this operation is now being performed successfully with machines that have been built by the road especially for this purpose. The details of these machines, and of the method of their operation, are described in this article

Front View of the Ballast Shaper with the Intertrack Blade in Operation, and a Typical Stretch of Ballast Slope as it Appears After Both the Shaping and Hand-Finishing Operations Have Been Completed

Erie Uses Mechanical Ballast Shapers

THE dressing of crushed-stone ballast is one task that has not been mechanized on most roads, but on the Erie this work is now being performed mechanically with a high degree of success by equipment developed and built especially for this purpose by the railroad's own forces. At present two units of this equipment are in service, each of which consists essentially of a flat car carrying two adjustable shaper blades, one on each side. It is stated that with these machines the ballast section can be formed to such a high degree of refinement that only a small amount of follow-up work is required, this work being such that it can be accomplished at the rate of about a mile of track a day by four men.

History of Development

The idea of dressing ballast mechanically had its inception on the Erie several years ago, and the first ballast shaper was built in 1936. The railroad was so well satisfied with the performance of this machine that another unit was constructed several years later. While the latter machine was based on the same principles as the original unit, it incorporated numerous mechanical improvements that had been introduced as a result of the railroad's experience with the earlier machine. Further improvements have since been made in both shapers, as a result of which it is felt that they have now been brought to a high degree of perfection. Also, as a result of these changes, the machines are now essentially similar in all important details.

Each of the ballast shapers embodies a standard 40-ft. steel flat car. At the forward end of the car is a control cab of frame construction which is raised about two feet above the floor of the car. Behind the cab are the two shaper blades which are placed directly across from each other on opposite sides of the car. The blade on the left side is designed solely for shaping the ballast in the intertrack space, while that on the right is used only for dressing the shoulder ballast. By reason of a variety of adjustments, all of which are actuated by air motors or cylinders, the blades are highly flexible and can be adapted to any track conditions that may be encountered in this work.

Blades Operate Independently

The two blades are entirely independent of each other and separate controls are provided for them. This permits the ballast on both sides of the track to be dressed simultaneously on all tracks that have an intertrack space on one side and shoulder ballast on the other. The machine is accompanied by one full-time operator, and when a second man is needed to operate one of the blades, the regular operator is assisted by a track foreman or other available employee fa-

miliar with the operation of the unit. When in operation the car is pushed by a locomotive at a speed of about three miles per hour.

The Intertrack Blade

Since the two blades perform entirely different functions, they are altogether dissimilar in construction. The blade on the left (the intertrack side) consists essentially of a transverse steel plate, 7/8 in. thick and 36 in. wide, which is arranged at right angles to the track when in operation. On the Erie, the depression in the intertrack space is about 8 in. deep at its point of maximum depth and has side slopes of 1¾ :1. The purpose of the intertrack shaper is to form the ballast approximately to this section, and this function is accomplished by forcing the blade, while in the transverse position, through the ballast at the proper depth so that it acts as a template. To adapt it to this purpose, 12 in. of the width of the lower edge of the blade at each corner is cut off, or truncated, on the proper slope, so that it conforms approximately to the standard section. Since the lower edges of the plate are subjected to abrasive wear, they are protected by wearing plates rivetted to them.

To make it possible for the blade to carry forward ballast accumulated at points of surplus for deposition at low places, and also to prevent ballast from being thrown over onto the ties, the blade is equipped with a wing on each side. These wings, each of which consists of a rectangular steel plate 30 in. wide, are fastened to the vertical edges of the blade plate by hinges and may be adjusted at any desired angle, although they are usually so arranged that they extend out in front of the blade at right angles to it. When in this position the wings and the blade form a box for holding and carrying forward surplus ballast that may be picked up.

The foregoing description of the blade pertains to its shape when it is used on tangent track. Since the ballast section in the intertrack space on curves varies considerably from that on tangent track, it was necessary to provide an adjustable feature whereby the shape of the lower edge of the blade could be altered as desired. This was accomplished by providing an adjustable steel shoe at each truncated corner of the blade.

Adjustment for Curves

These shoes, each consisting of a 7/8-in. plate, are attached to the rear side of the blade and of the corresponding wing. When the shaper is operating on tangent track they are kept in the raised position, that is, up out of sight behind the blade, but when the machine moves onto a curve, necessitating a change in the shape of the blade, the shoes can be dropped down to any desired position by the operator by lowering the wings. When they are at their extreme low point, the lower edges of the shoes are in line with the horizontal portion of the lower edge of the blade; thus, the lower edges of the shoes and the blade form a straight line extending the full width of the blade. Each wing (and attached shoe) is raised and lowered by an individual air cylinder mounted overhead on the blade plate.

The blade described above is hung from an arm or outrigger which is pivoted in a horizontal plane about its inner end where it is attached to a vertical post fastened to the flat car. When the blade is in operation, the outrigger projects outward over the intertrack space, but when it is not in use the arm and the blade are folded back against the side of the car. When the blade is in the operating position, the outrigger is braced from the rear by a diagonal strut involving a telescoping feature.

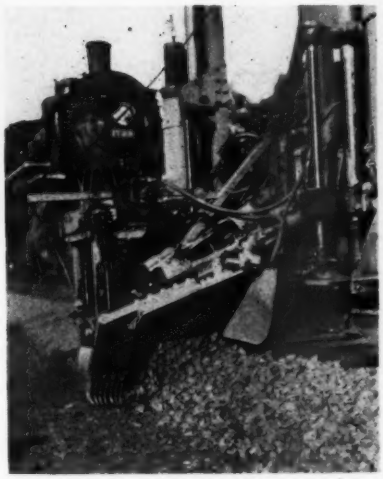
Another diagonal brace, this one in a vertical plane, is provided directly above the outrigger. The inner end of this brace is attached to, and pivoted about, the vertical post mentioned previously, while the other end is connected to the outer extremity of the outrigger. This brace also has a telescoping feature, operated by an air motor, by means of which it may be shortened or lengthened to raise or lower the outer end of the arm for the purpose of changing the transverse slope of the blade. The movement of the outrigger in this manner is made possible by the fact that it has a pin connection at its inner end. The need for changing the transverse slope of the blade occurs on curves where the intertrack ballast section, instead of embodying a depression as on tangent track, consists of a slope connecting the ballast lines of the tracks, and it is necessary to adapt the blade to the gradient of this slope.

Other Adjustments

Another feature of the blade is that it can be moved inward or outward on the outrigger in order to adapt it to varying track centers. To make this adjustment possible, the blade is mounted in guides on the outrigger, while the mechanism for moving it involves the use of an air motor. This motor is mounted on the carriage and

Left—The Ballast in This Intertrack Space Is About to Be Shaped by the Car Approaching in the Background. Above—This Close-Up View of the Intertrack Outrigger Shows How Surplus Ballast Is Carried Forward. Right—The Intertrack Space After Shaping

Left—View of an Outside Slope Before Passage of the Shaper Car. Below—Close-Up View of the Outrigger for Shaping Outside Ballast Slopes. Right—The Same Slope After Passage of the Car. The Small Amount of Surplus Ballast Will Be Disposed of by Hand



has a chain drive that actuates a threaded boss on a long screw which is attached to the outrigger. Still another feature permits the outrigger and blade to be raised bodily in order to clear grade crossings, turnouts and other obstructions. This vertical movement is accomplished by an air cylinder mounted on the car, by means of which the outrigger can be made to move up and down, through a range of 32 in., on the vertical post to which it is fastened at its inner end. Obviously, this movement is accomplished without changing the angle of the outrigger or the position of the blade with respect to the supporting arm.

From the foregoing description it is apparent that, by reason of its several adjustments, the blade has a high degree of flexibility which permits it to be adapted quickly to any track conditions that may be encountered.

The Outside Shaper

The device that is provided on the other side of the car for shaping the outside ballast slope also embodies an outrigger but, as noted at the outset, there is little similarity between the two outriggers or their blades or templates. The actual function of shaping the ballast slope is performed by a flat steel plate 42 in. long, measured parallel with the track, which is mounted on the outrigger in such a manner that, when in operation, it lies flat against the ballast slope at the desired angle. In this position the blade has considerable weight behind it, and as the car moves forward it presses firmly against the ballast, causing it to assume the proper angle and compacting it securely in position.

At its forward end the blade plate has an extension which flares upward, and to both edges of this extension are fastened flat steel plates in such a manner as to form the sides for a box-like recess. This recess serves to retain any ballast that may accumulate in front of the shaper plate until it is deposited at a point where there is a deficiency. To the lower side of this recess is fastened a toothed member 13½ in. long, which flares out from the ballast toe line in such a manner that, as the shaper moves forward, it serves to collect loose pieces of stone and return them to the slope.

To the lower edge of the shaper plate is welded a toe line "board," which consists of a 1-in. steel plate 8 in. wide. This "board" is placed on edge and is fastened to the plate in such a manner that 3 in. of its width projects below the latter. Thus, when the machine is in operation the weight of the shaper plate and outrigger forces the 3 in. of the board into the subgrade, with the result that a well-defined toe line is formed.

Control of Outside Shaper

The outrigger on which the shoulder blade is carried is mounted on a horizontal shaft placed lengthwise of the car. It is pivoted about this shaft and, when not in use, it is lifted into the clear in a rotating motion by means of a cable fastened to the end of the outrigger and extending to an air hoist on the car. Also, in order to permit the outrigger to be raised vertically, the entire assembly, including the horizontal shaft, is mounted on two vertical guides or posts. There is a vertical screw at each of these guides, each of which extends through a threaded boss attached to the outrigger. For raising and lowering the outrigger these screws are actuated through bevel gears by an air motor. To facilitate the lifting of the outrigger assembly, a counter balance weight is provided at the location of each of the vertical weights.

Adjustment Features

Since there is considerable variation in the dimensions and inclination of the shoulder ballast at curves as compared with tangent track, it was necessary to provide the shaper blade with a number of adjustable features to permit it to be adapted to the varying conditions. In order that the width of the blade may be varied as desired to accommodate it to slopes of different heights, it is constructed with a telescoping feature. This feature is actuated by two sets of rack-and-pinion gears mounted on the outrigger above the shaper blade, each set being operated by a separate air motor.

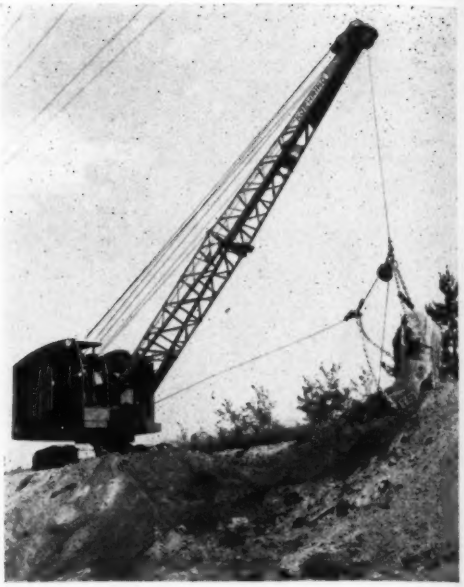
Likewise the angle of inclination of the blade can be adjusted as desired by two screw assemblies, each powered by an air motor, that are provided at the outer end of the outrigger. Moreover, since the width of the ballast shoulder at the ends of the ties on the Erie is 12 in. at the high sides of curves and 6 in. elsewhere, an adjustment for meeting this condition was provided.

Air for the operation of the air motors on the ballast shaper is provided by an air pump mounted on the car, this source being supplemented when necessary by air from the train line. The car operates most efficiently when the air pressure is kept in the vicinity of 120 lbs. per sq. in., but it is reported that it functions satisfactorily on pressures as low as 90 lb. An air

(Continued on page 452)

Wire Rope— Choose It Carefully for Work Equipment

Such subjects as types of strand construction, causes of failure, the types that are best suited for different applications, lubrication and seizing, are discussed in this comprehensive report by a subcommittee of the Committee on Maintenance of Way Work Equipment of the American Railway Engineering Association. R. A. Morrison, division engineer, Pere Marquette, was chairman of the subcommittee



The Proper Selection, Care and Inspection of the Wire Rope on Work Equipment Is Important from a Safety Standpoint and Also if Maximum Life from the Rope Standpoint and if Maximum Life Is to Be Realized

WHILE both wire rope and manila rope have certain advantage for specific uses, the latter, because it is softer on the hands and owing to its qualities of flexibility and elasticity, is limited in its application to manual operations. For use with work equipment, wire rope has the advantage of greater strength for the same diameter and weight; its strength remains equal whether it is wet or dry; and its length is practically constant under all extremes of weather conditions.

Construction

In the construction of wire rope, iron and steel (cast, plow, and improved plow) are usually employed. Iron wire has a tensile strength of from 70,000 to 80,000 lb. per sq. in. and should be used where strength is unimportant. Cast-steel rope has a tensile strength of 180,000 to 200,000 lb. per sq. in. and is used for light-duty service. Plow steel has a tensile strength of 200,000 to 220,000 lb. per sq. in., while improved plow steel has a tensile strength varying from 220,000 to 240,000 lb. per sq. in. and is generally used for making all-purpose rope.

Wire rope is made with different numbers of strands and numbers of wires to the strand, according to the purpose for which the rope is to be used. Flexibility is gained by increasing the number of strands and the number of wires per strand in a given diameter. Standard wire ropes are made with either a fiber (hemp) center, a wire-rope center, or a metallic (wire-strand) core.

The fiber center is usually saturated with a lubricant which acts as a cushion to preserve the shape of the rope and helps to lubricate the wires. However, factory lubrication of wire rope cannot be expected to last throughout the life of the rope. Failure to lubricate wire ropes, especially those exposed to corrosive elements or to severe stress or bending conditions, will cause an early exhaustion of the core preservative and rapid deterioration of the core. The life of the rope is largely measured by the life of the core. A metallic core or wire rope center adds about 7½ per cent to the rope's strength, and costs about 15 per cent more than a hemp center.

Types of Lay

The term "lay" refers to the twist or helical form which is characteristic of all wire rope. "Strand lay" refers to the twist of the individual wires composing a strand, while "rope lay" refers to the twist of the strands around the core. In a "right lay" rope the strands are laid similar to a right-hand screw thread, and a "left lay" rope is laid in the opposite direction. "Regular lay" applies to rope of either direction of lay in which the wires in the individual strands are laid in the direction opposite from that of the rope itself.

"Lang lay" refers to a rope in which the wires composing the strands are laid in the same direction as the rope. Ropes may be either "right lang lay" or "left lang lay." Ropes with lang lay, unless pre-formed, are more apt to kink than ropes made with regular lay. In "reverse lay" wire, the alternate strands are laid right and left lay. Ropes of this type eliminate twisting and rotating and reduce stretching to a minimum.

Strand Constructions

Round strand.—This construction consists of a number of round wires twisted in a round strand. The wire rope usually consists of 6 or 8 strands, generally made of 7, 19 or 37 wires each.

Flattened strand.—This construction usually consists of 5 or 6 keystone or oval strands and a hemp center; thus, the outer wires conform to a circle, and provide a greater wearing surface between strands and a smooth outer surface in contact with drums, sheaves and pulleys.

Non-rotating.—The usual type of round strand non-rotation wire rope consists of 18 strands of 7 wires each, of which the 12 outer strands are laid in the opposite direction. This arrangement equalizes the rotating or twisting tendency that is present where all strands are laid in the same direction.

Steel clad.—This is a round strand construction having each strand wound spirally with a flat steel wire. By so wrapping each strand the wires at the surface and where the strands adjoin each other are relieved of considerable wear.

Locked coil.—This construction is

that of a succession of concentric layers of specially shaped wires, the surface layer being of locked section. The locking outside wires give a smooth, cylindrical surface.

Filler Wire.—Ropes of the Warrington or Seale construction, having individual wires wound between strands, are much in use where additional strength is required.

Pre-formed wire rope.—Pre-forming is a process of shaping wires and strands to the normal form they will occupy in service and is applied to both round and flattened strand constructions where conditions require a rope that will not unravel or fly apart if the ends are not seized, that will not kink easily, is more flexible for spooling and is easily handled.

The factor of safety for wire rope should be determined after consideration of such data as types of loads; acceleration and deceleration; rope speed; rope attachments; the number, size, and arrangement of the drums and sheaves; conditions causing corrosion and abrasion; and the length of time the rope has been in service. For general use, the working load should not exceed one-fifth of the breaking strength of the rope. This means that the factor of safety should not be less than five; in some cases, a safety factor of as much as eight is required for safe operation.

Table 1

The critical tread diameter for various constructions of steel rope may be taken as follows:

Construction of Rope	*Critical Tread Diameter*	*Minimum Recommended Tread Diameter*
6 x 7	28 *d**	42 *d*
18 x 7	24 *d*	36 *d*
6 x 19	20 *d*	30 *d*
6 x 31	15 *d*	22 *d*
6 x 37	12 *d*	18 *d*
8 x 19	12 *d*	18 *d*

**d* = rope diameter in inches.

Causes of Failure

Some of the more common causes of the failure of wire rope may be expressed as follows:

1. Use of ropes of incorrect size, construction or grade.

2. Allowing ropes to drag over obstacles. In this manner rope is exposed to unnecessary wear, kinking, etc.

3. Lack of proper lubrication. This causes heating and excessive friction wear.

4. The use of sheaves and drums of indaquate size that cause short-radius bends. The largest practical sizes of drums, sheaves and pulleys should be employed, and high speed should be avoided. The tread diameter in a drum or sheave should be in accordance with the figures shown in Table 1.

5. Over-winding or cross-winding on drums.

6. Sheaves and drums are defective or out of alinement. Badly-worn sheaves cause the winding and cutting of the strands. Poor alinement of sheaves causes excessive wear and often overstressing of the rope.

7. Ropes jumping the sheave flanges. Rope should be let out slowly so as to be taut at all times.

8. Effects of heat, moisture or acid fumes.

9. Improper fittings. Clamps, thimble, and other fittings must be of proper size.

10. Permitting rope to untwist. This can be avoided if the ends are properly seized.

11. Kinking. Rope should not be allowed to twist when slack; if a kink is formed, it must be straightened out before it enters a sheave, or a strain is placed on the rope.

12. Severe overloads, reverse bends, and other excessive strains.

13. Internal wear because of grit penetrating between the strands and wires. Unless this becomes absolutely necessary, ropes should not be allowed to drag along the ground or through material where likely to pick up grit.

14. The angle between the center line of the sheave and the rope as it winds on and off the drum is called the fleet angle. This angle should be kept as low as possible (1½ deg.). A large fleet angle may cause the rope to spool loosely on the drum or crowd itself until it jumps back to the previous layer, and also may cause the rope to rub against the flanges of the sheave and thus produce undue wear.

Recommended Types

To determine the particular rope that will give the most economical service for a given application, the various kinds of stresses and strains, and the nature of the work to be done

Table II—Data on Various Types of Wire Rope Used with Maintenance of Way Work Equipment

Rope Diameter in Inches	*Construction*	*Approx. Wt. Per Foot, Pounds*	*Strength, Tons*			
			Iron	*Cast Steel*	*Mild Plow Steel*	*Improved Plow Steel*
¼	6 x 7 hemp centers	0.095	.....	2.0	2.15	2.35	2.7
½	6 x 7 " "	0.38	3.57	7.5	8.2	9.0	10.3
¾	6 x 7 " "	0.84	7.86	16.5	18.1	19.8	22.8
1	6 x 7 " "	1.50	13.7	29.0	31.9	34.8	40.0
1¼	6 x 7 " "	2.50	21.0	45.5	48.7	53.0	61.0
1½	6 x 7 " "	3.38	29.7	62.5	68.7	75.0	86.5
¼	6 x 19 " "	0.10	0.97	2.1	2.3	2.5	2.9
½	6 x 19 " "	0.40	3.57	7.7	8.5	9.4	10.8
¾	6 x 19 " "	0.90	7.86	16.8	18.7	20.6	23.7
1	6 x 19 " "	1.60	13.7	29.5	33.0	36.5	42.0
1¼	6 x 19 " "	2.50	21.0	46.0	51.0	56.5	65.0
1½	6 x 19 " "	3.60	29.7	65.0	72.5	80.5	92.5
2	6 x 19 " "	6.40	51.8	114.0	127.0	140.0	161.0
¼	8 x 19 " "	0.09	.....	1.79	1.97	2.15	2.47
½	8 x 19 " "	0.36	.....	6.8	7.5	8.2	9.5
¾	8 x 19 " "	0.82	.....	14.8	16.3	17.8	20.5
1	8 x 19 " "	1.45	.....	26.0	28.6	31.2	35.8
1½	8 x 19 " "	3.26	.....	57.5	63.3	69.0	79.5
¼	6 x 37 " "	0.10	.....	2.0	2.2	2.4	2.8
½	6 x 37 " "	0.37	.....	7.7	8.4	9.2	10.6
¾	6 x 37 " "	0.87	.....	16.4	18.1	19.8	22.8
1	6 x 37 " "	1.55	.....	28.6	31.5	34.4	39.5
1¼	6 x 37 " "	2.42	.....	44.3	48.9	53.5	61.5
1½	6 x 37 " "	3.49	.....	63.5	70.0	76.7	88.2
2	6 x 37 " "	6.20	.....	111.0	123.0	135.0	155.0
½	18 x 7 " "	0.43	.....	7.1	7.9	8.7	10.0
¾	18 x 7 " "	0.97	.....	15.6	17.3	19.0	21.9
1	18 x 7 " "	1.73	.....	27.3	30.5	33.8	38.8
1¼	18 x 7 " "	2.70	.....	42.5	47.2	52.3	60.0
1½	18 x 7 " "	3.89	.....	60.0	67.0	74.5	85.5
½	6 x 31 " "	0.39	.....	.....	.....	9.2	10.6
1	6 x 31 " "	1.55	.....	.....	.....	34.4	39.5

For metallic center construction add 7½ percent to the listed strength.

or handled should be known. Regular-lay and lang-lay rope cost the same. Lang-lay ropes are about 15 per cent more flexible than regular-lay ropes. Because of the greater wearing surface of the wires in the lang-lay ropes, less wear results on the sheave and drum equipment. However, sheaves of very small tread diameter or pinching grooves in sheaves are both detrimental to lang-lay ropes. Also, lang-lay ropes will crush out of shape more readily than the regular-lay ropes when wound on small drums under heavy winding tension. As a rule, swivels should not be used with lang-lay ropes except as individually recommended for particular equipment. The types of rope that are best suited for particular applications are given in the following:

Hoisting ropes.—For elevators of all kinds, coal hoists, derricks, and similar equipment, six-strand ropes with 19 wires, either flattened or round construction, with hemp centers, are recommended. For unusually heavy loads, metallic cores are best.

Dirt-moving equipment. — Hoist lines should have 6 strands with 19 wires, and hemp centers. If drums are large, 6 strands with 7 wires and hemp centers are satisfactory. Drag, boom and haul-back lines should have 6 strands with 19 wires and hemp centers, or, if greater strength is needed, should consist of 6-by-12 over 12 over wedge-flat strand with metallic centers. Trip lines should have 6 strands with 19 wires and hemp centers.

Shop cranes.—As a rule, the drums and sheaves are small, so ropes of 6 strands of 37 wires, with hemp centers, are preferred.

Bridge cranes.—Six strands of 19 wires, with hemp centers.

Sash and bell cords.—Six strands of seven wires, with hemp or cotton centers.

Guy ropes.—Galvanized rope made with seven steel wires forming one strand.

Aerial tramway or cableway.—Use locked coil-type ropes.

Necessity of Lubrication

When one realizes that in 6-by-19 rope there are 114 wires and a hemp core or heart, making a total of 115 working parts, the necessity for lubrication is evident. Crude oil should not be used for rope lubrication as it is very apt to contain impurities that are harmful to both the core and the steel wire. Greases made from a graphite base are recommended for all types. Whenever possible, hot lubricants should be used and applied when the rope is under a very light load so as to get the greatest possible penetrating effect. The frequency with which ropes are lubricated is a matter that must be determined by judgment based on the service being performed, and should be often enough to keep the rope pliable and showing evidence of lubrication in the valleys between the strands.

Ropes used on draglines, which are necessarily drawn through sand and dirt, should be kept well wiped and oiled as the coating provided by the lubricant keeps the grit from penetrating under the strands, and extends the life of the rope more than enough to offset any bad effects produced by any grit that may cling to the lubricant on the outside of the rope. When placed in storage, the rope should be protected against the possibility of rust and drying by a protective coating of a non-corrosive lubricant.

Seizing

To prevent the ends of wire rope from unravelling, they should be seized or bound with a small galvanized seven-wire seizing strand or with low-carbon annealed steel wire. The wire should be about 1/12 to 1/15 the diameter of the rope, varying from No. 13 gage wire for ½-in. rope to No. 9 gage wire for 1-in. rope. The seizing wire is wound tightly around the rope by hand, keeping the coils together. To secure the bindings, the ends of the seizing wire are pulled taut with a pair of pliers or Carew cutters to take up the slack, and are then twisted counter-clockwise and the surplus cut off. The twist should then be pounded flat against the rope. Three bindings should be applied to insure full protection of the rope ends. Before cutting a rope, it is most important that seizings be placed on each side of the point where it is to be cut.

When it is necessary to anchor an end of a wire rope in a hitching or holding device, the following procedure should be carried out:

1. Properly seize the rope from the end to a point on the rope beyond the part that is to be inserted.
2. Thread the rope through the anchoring or holding device.
3. Remove the seizing twists on that portion of the rope end that is to be housed, which is referred to as the "mule tail."
4. Untwist the strands and cut out the core.
5. Unravel the wires and clean them thoroughly. If acid is employed to cut grease, follow its use by cleansing with boiling water containing a small amount of soda.
6. Use a vise or clamp to hold the mandrel or socket in the correct location on the rope.
7. Seal the bottom of the device with putty or clay.
8. Make sure the axis of the rope is in proper alinement and pour in melted zinc. When the zinc has solidified, remove the clay or putty seal. The zinc should be worked at a temperature of about 830 deg. F.; a higher temperature will anneal the wires. Do not use babbitt metal or lead, for the strength of the fastening will be less than that of the rope.
9. Where wire rope clips are applied to obtain maximum strength, make sure the proper size is used. The U-bolt and saddle grooves should fit snugly on the rope. All clips should be applied in the same manner, namely, the U-bolts over the free end and the saddle to that portion of the rope carrying the load. As a rule three clips should be applied, and tightened to make sure there will be no slipping.

Erie Uses Mechanical Ballast Shaper

(Continued from page 449)

reservoir of ample size, in the form of a cylindrical steel tank, is mounted transversely on the floor of the car directly in front of the cab.

Controls

A set of control levers for each outrigger is provided in the cab, each set being located on the same side of the cab as the outrigger to which it applies. Several window openings are provided on each side to enable the operator to lean out of the cab while the car is in motion to observe the operations. Besides the operator (with an assistant if both blades are being operated), the only other persons necessary to the operation of the car are the work-train crew.

The two ballast shapers are used on a system basis, and during the working season they are shifted from place to place as may be necessary to keep up with ballasting and surfacing operations. Generally speaking, the cars are used primarily to dress the ballast following such work, but they are also frequently used to reform the ballast section at locations where for any reason it has lost its shape.

The Erie's ballast shapers were developed and have been perfected under the general direction of J. C. Patterson, chief engineer maintenance of way, and under the direct supervision of E. H. Ness, supervisor of work equipment and welding.

What's the ANSWER?

When Ties Become Scarce

In view of the impending shortage of ties, what changes should now be made in the practices relating to tie renewals? Why?

Calls for All Measures

By F. W. Biltz
Engineer Maintenance of Way, Reading, Reading, Pa.

A review of the tie situation from the standpoint of depleted supply and the causes thereof should bring a clearer realization of the seriousness of the situation and the necessity for prompt and drastic action to make the dwindling supply meet requirements. Inventories of the largest ten tie producers show that the supply of ties on hand on January 1, 1942, was only 82 per cent of those on hand January 1, 1941, and on January 1, 1943, this had dropped to 66 per cent of 1941.

One of the main influences contributing to this situation was the amendment to M-216 issued by the Office of Price Administration on December 1, 1942, which placed a ceiling of approximately 10 per cent, for the eastern half of the United States, over the prices of March, 1942. Restricted by this ceiling, the producers were encouraged to cut the wood into merchantable sizes. Another strong influence in restricting production has been a labor shortage brought about by selective service and migration of men from the woods to war industries. Again, the restrictions placed on rubber and gasoline have added their quota to the influences restricting production. Finally, the demands for war transportation have resulted in a scarcity of barges and tugs which formerly moved a large number of ties from the south to the eastern seaboard.

Changes in practices with respect to tie renewals to meet this new situation should begin with a review and revision of the spotting survey. While it may be economical, under normal conditions, to remove ties when reballasting, that will not outlast the cycle, the depleted stock of ties makes it necessary to stretch out tie life to carry out the ballasting program. If this is not done and the old criterion of tie removals is adhered to, a decrease in the amount of track that can be rebuilt annually will result, and the track cycle will be increased, to the detriment of the track program. As an example, a tie that is badly split, but sufficiently sound to provide a bearing under the tie plate, or one that is spike-killed, but has a good tie on either side, which we would ordinarily remove for reinsertion in a side track, should be left in the main track under existing conditions.

Utilization of additional kinds of wood will also aid considerably during the present shortage. A road that has been using oak ties exclusively can increase its available supply appreciably by adopting mixed hardwoods or pines, while utilization in side and yard tracks of as many as possible of the ties removed from main tracks will ease the requirements for these tracks.

Because of the possible curtailment of the tie program, it will be necessary to curb the ambitious foreman who will have his allotment of ties in and will be clamoring for more before his neighbors are finished. Distribution of ties should be controlled closely to insure a uniform condition for all sections. Avoid slot spiking and insist on adequate anchorage with anti-creepers, as this will prevent slewing of the joints and its destructive effects on the ties. Road foremen of engines and all transportation officers should be keyed up to prevent the dumping

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in August

1. Is it practical to build up or recondition switch points by welding? If so, should they again be used in main tracks? Why? What precautions should be observed?

2. In what ways can the use of critical materials be avoided in the construction of floors? Are there disadvantages?

3. What practices in the use of track jacks tend to shorten their service life? How can they be avoided?

4. What considerations are involved in the adaptation of second-hand structural steel for use in existing bridges?

5. In view of the existing labor shortage, what measures can be taken to insure maximum use of the power machines and power tools available? Who should be responsible?

6. How should raw water samples be taken to assure accuracy and uniformity of tests? How should they be taken from locomotive boilers in operation? From stationary boilers?

7. What measures can be taken to keep right-of-way fences in good condition in view of the present shortages of labor and materials?

8. What methods for transporting bridge and building gangs and materials are most suitable today, in view of the greater speeds and frequency of trains and the present restrictions on tires and highway vehicles?

of ash pans at points other than those designated.

Reduced supplies of ties usually bring forth proposals to relax standards. The A.R.E.A. Committee on Ties has gone on record emphatically against this proposal, in Bulletin 437, contending that such a move will in no way alleviate the situation. Fortunately, during the immediate future at least, the railways will not be required to compete with the government and government contractors for ties, as they have been compelled to do during the last two years.

Every measure should be taken that will extend the life of ties in track, and by means of which the supply of new ties can be stretched out over the greatest mileage, consistent with the maintenance of good line and surface, and the continuation of track reconstruction programs.

Keep Condition Uniform

By C. E. Miller
Assistant Engineer of Maintenance, Chicago & North Western, Chicago

It is evident that the shortage of ties is already serious and that it is likely to be still worse in 1944. It becomes important, therefore, that the available supply be distributed where maximum benefits will be derived. There will also have to be some departure from standard practices, prompted by the idea of maintaining safe track during the emergency, rather than of long-range economical maintenance. Some of the things that can be done to accomplish these results follow.

Do not remove a tie that still has one additional year of life, even though it is economical to do so. The old tie will give better service where it is than if moved to a new position, possibly in a side track. Ties should be distributed on the basis of the traffic now being handled, for normal traffic density may be changed considerably by reason of war demands, and tie installations should be made to meet a rather short period of such traffic, assuming that normal conditions will again prevail at the close of the war.

Give preference to the renewal of joint ties. Spot one good tie between two defective ties, provided this will provide sufficient rail support for another year. Where existing ties will hold the surface but not the gage, only enough new ties should be installed to hold the gage. In surfacing out of face, or where new rail has been laid, if there are less than the standard number of ties, no attempt should be made to install a greater number of ties merely to meet a standard. This should be done only where traffic conditions are such that more ties are actually needed to support the rail. Where track is surfaced out of face, and heavy tie renewals would normally be made as a matter of economy to avoid disturbing the track for several years, this practice should now be modified to conserve ties rather than to effect economy.

Tie installations should now be made with the view of keeping a uniform tie condition, consistent with the amount and kind of traffic, so that no part of a district will be improved materially at the expense of the remaining parts.

Critical Materials and Roofs

In what ways can the use of critical materials be reduced or avoided in the installation and maintenance of roofs and roof drainage? What are the limitations?

Will Have Long Life

By F. H. Soothill
Chief Estimator, Building Department, Illinois Central, Chicago

A roof constructed of good materials, correctly applied and adequately maintained, will have a surprisingly long life. However, these features do not always receive the consideration that their importance justifies. Many roof troubles can be traced to inadequate maintenance, or to neglect to make repairs at the right time, rather than to faulty materials or poor workmanship at the time of application. To gain maximum life, the first step is to adopt a definite maintenance policy, together with a uniform plan for inspecting and recording information regarding roof installations and repairs. Such a record should, preferably, be in card-index form and should indicate location, division, name (or number) of structure, date built, type of construction, pitch of roof, eaves or parapet, dormers, skylights, hips, valleys and type, manufacturer and applier of original roof covering, date applied; type, kind, manufacturer's name and the material used in making repairs or renewals, date of repairs and renewals, company making repairs; causes of failure, date of inspection, recommendations, name and title of the inspector, guarantee period for the original roof, guarantee period and name of guarantor for the renewal roofing. Having a definite policy and detailed record, we may proceed to diagnose our troubles and prescribe ways and means to avoid, or at least reduce our consumption of critical materials.

Before making repairs to a tile roof, the premises should be searched for spare tiles. If this fails, it may be possible to remove old tiles from less exposed areas for replacement of those more prominently in view. The areas from which removals have been made can then be repaired with the nearest duplicates available. Cracked or broken slate or asbestos shingles may be replaced in kind or, if not too badly broken, patched with plastic roofing cement by means of a trowel or calking gun. Slate or asbestos shingles may be coated with a cold liquid asphalt applied with a brush or with a plastic asphalt applied with a trowel. If the fastenings are intact, slate roofs can be tightened up by drilling small holes, renailing and sealing the nail heads with plastic cement.

A metal roof in fair condition can be carried by applying one, but preferably two, coats of red lead or sublimed blue lead directly to the surface after cleaning. Plastic cements should be avoided, unless the composition of the plastic material is such that it will not harm the metal. Metal, slate, tile, wood and concrete roofs, skylights, flashings and sheet metal work may be waterproofed by the application of cotton fabric or muslin, applied with linseed oil, bituminous paint or other adhesive coating agent.

Loose or warped asphalt shingles can usually be made secure by applying plastic roofing cement at the lower edge. Occasionally, it will be necessary to nail the raised corners, and apply roofing cement over the nail head. To obtain maximum life from prepared roofing it must be inspected frequently and be well maintained. Before the light oils have evaporated from the asphalt, leaving the roof dry and brittle, the roof should be given one or more coats of a liquid coater recommended by the manufacturer of the roofing. If applied in time, one coat will be sufficient to restore the roofing, as nearly as this is possible, to its original state. If delayed too long, two coats may be necessary. The application of a heavy coating of any kind over old

roofing that has lost its original oils is of doubtful economy. When making repairs to prepared roofing, special attention should be given to securing the outer edges at the eaves, the valleys, the hips, the ridges and up the slopes of the roof, with a view of insuring against the wind loosening and destroying sections of the roofing. Seams at the junction of adjacent sheets are often the source of trouble which may be remedied by applying plastic roof cement, with or without the use of an asphalt-saturated fabric.

Outstanding as the long-life roof today, the tar and gravel roof also requires the minimum of maintenance. However, when maintenance is needed, it should be made promptly and at regular intervals. A tar roof usually needs attention before leaks are in evidence. This can be determined, however, only by competent attention. A five-ply roof of this type, guaranteed for 10 years, will probably last for 15 years with no maintenance, but at the end of this period may require replacement. However, if the gravel is removed between the seventh and the ninth years, the flashings are tightened up, the roof is mopped with tar, and the gravel is replaced, the life expectancy may be extended indefinitely, provided the operation is repeated at proper intervals.

The light oils in asphalt tend to evaporate over a period of years, and built-up roofs of this type should be given top dressings of hot asphalt, as inspection indicates that this is necessary. The dressing should not exceed 30 lb. per square of 100 sq. ft., since a heavier coating will tend to crack and disintegrate. It is not advisable to apply a second dressing unless it is reinforced with a layer of felt, for it will tend to alligator and crack. Close attention to the condition of roofings and repairs carefully made, as outlined, will greatly extend the life of roofs and thus avoid the use of critical materials.

Good Maintenance Helps

By Supervisor of Bridges and Buildings

Obviously, good maintenance will prolong the life of existing roofs and thus reduce the demand for new materials, of both the critical and non-critical classifications. However, in the ordinary course of events, some roofs will need to be replaced, and here a considerable saving in the use of critical materials may become possible. If metal, that is, copper, zinc or aluminum, valleys are in good condition, they can be left in place, but it may be a good precaution to paint them. If they must be replaced, this can be done with prepared roofing, which should be coated with hot tar or hot asphalt, depending on the original impregnation. Metal flashing should be replaced in the same way.

Metal gutters can be replaced with wood gutters or, in numerous cases, dispensed with entirely. In fact, while it is admitted that gutters are needed on certain classes of buildings, it has been my contention for many years that they are installed on many others quite needlessly, where no harm will be done by letting the roof drainage discharge over the eaves. On many buildings, strictly as a conservation expedient, down spouts that have failed can be replaced by rectangular spouts built up with four boards of the correct width.

As for the roofing itself, this can be asphalt shingles, prepared roofing, asbestos shingles or the built-up type, using roofing felt impregnated with either tar or asphalt. None of these materials is now on the critical list, although some of them cannot be obtained quickly.

Metal valleys, that need attention, where the roofing is in good condition, can be carried by applying light canvas or muslin by means of a coating of red lead. This will sometimes extend the life for several years, or indefinitely if kept painted.

Power Tools for Section Use

What power tools can a section gang make effective use of? Should they be assigned permanently? Why?

They Multiply Man-Power

By W. L. Roller
Division Engineer, Chesapeake & Ohio, Columbus, Ohio

It has been the universal practice to equip section gangs with hand tools, and there is as yet practically no evidence that changes in this practice are imminent. In fact, there is a decided reluctance on the part of most maintenance officers to recognize that power tools multiply our efforts and that in expediting the work they are making up, in part, for the shortage of men that is now becoming so acute. About the only widespread departure from the use of hand tools by section gangs is the adoption of the gasoline motor car.

There has been a tendency in recent years to relieve section gangs of certain items of work, such as out-of-face surfacing, bolt tightening, laying rail, etc. It has been found that these and similar jobs can be performed more expeditiously and economically by larger floating gangs, and with less overall interference with traffic. By equipping this larger force with power tools, it can obtain better and more lasting results. By the same token, it can be shown that by careful planning, and by placing certain power tools in the hands of the section forces they can effect an improvement in the quality of maintenance and at the same time reduce its ultimate cost.

Certain items of work common to all sections, may be performed by a small force at any time that is convenient to the supervision. These include full bolting, adjusting bolt tension, cleaning ballast and spot tamping. By scheduling such items over a number of sections, power tools can be used effectively, either to supplement or substitute for hand labor. Power drills, power wrenches and tamping tools can all be used by a few men, and are distinct labor savers. The economy, often overlooked, is that where they are used to supplement manual labor, work is frequently performed that would otherwise be neglected, and the standard of maintenance is thereby raised. For these reasons, a small off-track, self-propelled power unit, equipped with various tools, such as drills, wrenches, cribbing and tamping tools, would be well adapted for use by small gangs. Obviously, it is not feasible at this time to equip every section gang with power tools, but they can be passed along from section to section, on a regular schedule.

Two Tools Suitable

By C. S. Kirkpatrick
Chief Engineer, Missouri Pacific Lines, Houston, Tex.

There are two power tools that I consider suitable for permanent assignment to section gangs in this section of the country. One of these is the unit tie tamper; the other is a small weed burner. Practically everyone engaged in track maintenance is familiar with or knows of these two tools, so that a description is unnecessary. The weed burner can be used to advantage during the growing sea-

son, which extends for about six months in the southern part of the United States. The tie tampers are always useful and should always be with the gang. To the extent that a laborer uses the tamper, to that extent is his efficiency improved. The tie tamper is a tool that, when started and kept going, assures a satisfactory output and a good quality of tamping.

Other power tools that are used generally in maintenance, such as bolt tighteners, drills, welding outfits and many others are better operated by system gangs, and the two tools mentioned are the only ones that can be used effectively throughout the working season by section gangs.

Details to Conserve Rail

When laying rail, what details should be given particular attention when it is being laid, to conserve the rail and insure longer service life? What is the importance of each?

Times Have Changed

By O. H. Carpenter
General Roadmaster, Union Pacific, Pocatello, Idaho

Many of the details of laying rail do not now have the former importance, so far as supervision is concerned, that they once had, because of the use of power machines and tools which, when once adjusted, will continue to perform their work with only occasional supervision necessary. I consider the most important detail to be the squaring up of double-shoulder tie plates, so that the rail will be seated between the shoulders before it is gaged or spiked. Joints should also always be applied and the bolts tightened before the rail is gaged and spiked. If the rail is allowed to rest on the shoulders of any of the tie plates, many of the others will be spiked crooked, and the shoulders under the base may damage the rail. In any event, there will be a poor job of gaging and the line will be equally poor. One man with a gage and a lining bar should follow immediately behind the rail crane to move the rail to correct gage at intervals of a half rail length, and sufficient men should be assigned to straighten all tie plates and place them in position. These men should be at least a rail length ahead of the gage man to prevent twist in the rail because of shoulders under the base of the rail.

Adzing was formerly considered the most important detail to watch. Today, power adzers insure a good job with reasonably close supervision. The oiling of the rail ends and joint bars, and the tension in the bolts are also important items that require careful supervision, but for the latter we have another power machine that will do the bolt tightening uniformly, once it is set.

I consider the follow-up work, that is, the tamping of loose ties and the lining of the track, as part of the rail-laying operation, and equally important with any other item or items. If this is not done promptly and well, to give the rail a solid bearing before trains are allowed to pass over it at full speed, irreparable damage to the rail may result. If the plates have been straightened as they should be, with no shoulders under the rail, the follow-up work will be easier and the rail will be in better line and surface. If trains are allowed to run over newly-laid rail that is not in good line, surface or gage, they will do more to damage it and shorten its life than anything else connected with the job.

All Details Important

By C. W. Baldridge
Assistant Engineer (Retired), Atchison, Topeka & Santa Fe, Chicago

All details are important in laying rail. First of all, however, the ties should be adzed to a true surface, preferably by an adzing machine. The tie plates should be set accurately so that the shoulder will be squarely against the rail and the spikes can be driven true. The first line of rails to be laid should be gage spiked at only two points, if on tangent, then the intervening ties should be spiked carefully to avoid spiking the kinks or bends of the old rail back into the new. The second line of rails should be gaged to the first string at the usual number of ties.

Rail joints should be full bolted ahead of the spiking, and anti-creepers should be applied as closely behind the spiking as practicable. The fishing surfaces of the rail and the fishing and inside faces of the joint bars should be well-coated with a good quality of anti-rust grease or lubricant; immediately preceding the application of the joint bar, the bolts and spring washers should also be given a coat of lubricant.

Expansion shims should be used at each joint, and bolts should be tightened as uniformly as possible, keeping the bolt tighteners in correct adjustment for the tension desired. Do not allow the web or base of the rail to be struck by a spike maul or other tool that will nick or bruise the metal. The track should be surfaced as closely behind the rail gang as possible, care being taken never to set a jack under a joint. In all cases, the track should be lined accurately close behind the final surfacing.

Too Often Overlooked

By Chief Engineer

New rail deserves the same attention that is accorded ultra-modern streamlined equipment, to insure the maximum return on the investment, but, unfortunately, this fact is too often overlooked. Rail requires constant attention to every detail of the operation while it is being laid. Ties should be plugged and adzed to a level bearing for the new tie plates, and this can best be done with power adzing machines. The tie plates should be placed carefully so that the rail will not bear upon the shoulder of any of the plates. Before they are placed in the track, the rail ends should be flame-cleaned to remove mill scale, and oiled throughout the area occupied by the joint bars; and the fishing surfaces of the bars should be treated in like manner.

Particular attention should be given to providing correct allowance for expansion, and the metal shims should remain in place until the joints are fully tightened. Joints may be packed with a lubricant as the bars are applied. The middle bolts should be tightened before the outside bolts are. For gaging, the rails should be moved into position with bars or approved appliances. Under no circumstances should a rail be struck with a maul to jar it to or from the gage. If the track is in poor line or surface, the irregularities should be lined out as the first string of rail is laid, so that the second line of rails can be gaged accurately. This will eliminate the opportunity for slight irregularities of line in the old rail to be transferred to the new rail.

A sufficient number of anti-creepers should be applied as the rail is laid to retain correct spacing at the joints. A gang should follow behind the spikers to tamp loose ties, for the new joints seldom fall where the old joints were. If the joint bars and rail are

not flame-cleaned, a second tightening of the bolts should follow in a day or two to take up lost motion caused by loosening of the mill scale under traffic. A third tightening will be needed several weeks later to insure uniformity of tension. The new rail should be surface-ground to correct irregularities in height, and cross-ground to remove end flow and provide a slight bevel at the ends. Each of the foregoing items is so important to the life of the rail that it would be false economy to stress any one.

Cutting Down on Slow Orders

What measures should now be taken that would not be justified normally to avoid slow orders while repairs are being made to trestles? To steel spans? What precautions should be observed?

Cost No Bar Today

By L. G. Byrd

Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Delays and interruptions can scarcely be tolerated today in the movement of the amazing volume of traffic that the railways are now being called upon to handle. Much of it is of such urgent importance and must be moved so expeditiously that every supervising officer and foreman should understand the importance of keeping the structures safe and in condition for full speed at all times, regardless of cost. They must now be maintained to a higher standard than ever before to insure against delays to the movement of arms, munitions and other military supplies that are so necessary for the men at the front.

Too often, slow orders that are not required are placed when making repairs to trestles and steel spans. In those cases, where they are necessary, it often occurs that the length of the track and the time the order must be effective can be shortened if the work is planned carefully and all preliminary work is completed before the operation requiring the slow order is started. When heavy repairs or extensive renewals are being carried out, it will often be desirable to double up two or more gangs to speed up the work between trains, as well as to shorten the overall time.

It may be expected that the cost of the work will be greater where two or more gangs are combined in this way, but there will be greater overall economy in avoiding interference with traffic. However, flag protection should be provided in all cases before any vital part of the structure is disturbed or removed. On any job, all material should be preframed and no more of the structure removed than can be replaced safely and bolted up between trains.

We recently redrove and replaced a ballast-deck trestle 572 ft. long, where we required a 25-mile slow order for only 36 hours and stopped no trains by flag. The new bents were driven, capped and braced. In the meantime, the new deck was assembled on falsework alongside the old structure. When everything was ready, we jacked the old deck out of place and the new one in. This operation required only 1 hr. 45 min. and was completed between trains. This not only shortened the time the slow order was in effect, but was actually done at an economical labor cost.

Must Keep Them Moving

By General Inspector of Bridges

While, for many years, it has been considered almost a criminal offense to stop or even to slow down certain trains on certain roads, never before has there been a time when this was so true of all roads and all trains as it is today. Not only is much of the traffic carried by the railways today of urgent importance in itself, but because there is so great a shortage of cars and locomotives, any delays, in effect, aggravate this shortage. For this reason, it is becoming more and more necessary to eliminate slow orders and avoid stopping trains, except in cases of emergency.

To allow trains to pass at full speed over structures that are being repaired, calls for careful planning before the work is started and constant supervision after it is under way. In most cases, considerable preparatory work should be done before insertion of the replacement material. For example, if it is a job of renewing ties, say on a steel span, the new ties should be framed, treated and laid out at the bridge site in the order in which they will be used, and then brought onto the bridge in this order, plainly marked, so that there will be no confusion while they are being inserted. Furthermore, the framing of the ties should be checked carefully before they are to be installed to insure against delay, once the application has begun.

In many cases, avoidance of slow orders will increase the cost of the work appreciably, but this is a condition that must be borne to keep trains moving without delay. On the other hand, it will be a physical impossibility in some cases to permit full speed with safety. In such cases, the work should be planned and carried out in such a way as to reduce to the minimum the time that the speed restriction must be in effect. Furthermore, trains should be allowed to pass at the maximum speed compatible with safety. The track should never be broken or otherwise obstructed without flag protection.

Prolonging the Life of Belting

What methods can be followed to prolong the life of leather, rubber and canvas belting?

Buy Only the Best

By C. H. Ordas

Supervisor of Motor Cars, Chicago, Milwaukee, St. Paul & Pacific, Chicago

This discussion will be confined to belting used on work equipment. Because of space limitations on some of this equipment, as well as in an effort to keep down weight and cost, many drives have been used that do not permit the most economical use of belting. Yet, since most of the materials from which belting is made are needed by our armed forces, it is necessary that we prolong the useful life of belting in every possible way. Since most of the belting on work equipment is being employed out of doors, under the most unfavorable conditions of heat and cold, dryness and moisture, and exposure to abrasive dusts, oil and grease, it behooves all who use belting to protect it against these destructive agencies as much as possible.

Only the best grade of belting should be purchased. When in storage and in use, it should be protected

against greases, gasoline, all solvents, acids, alkalis, gases and extremes of sunlight, ozone, heat, drying and moisture. Belting should always be applied in accordance with manufacturers instructions. Pulleys or sheaves and shafting must be in perfect alinement. Laced belts should have absolutely square ends and be of correct length to allow for stretch. No belt should be wider than its pulley, but preferably ½ to ¾ in. narrower, particularly for crowned or flanged pulleys. Belt fasteners must be of the correct type and size or serious damage will result.

An oval punch, with the long diameter parallel with the side of the belt, should be used when punching a belt for lacing, and two lines of staggered holes should be employed, the number depending on the width of the belt, but no hole should be nearer than ¾ in. from the side or ⅞ in. from the end of the belt, and the second row should be not less than 1¾ in. from the end. The lacing should start at the center and should not cross on the side next the pulley.

When a belt slips or squeals on a flat drive it is either not tight enough, of insufficient capacity or has become dry and glazed or oil soaked. The remedies are self evident. An oil-soaked leather belt should be cleaned with carbon tetrachloride and redressed; a rubber belt with strong laundry soap and dried. Belt dressings not only lubricate the belt internally; they also maintain a high coefficient of friction, and should always be used in small quantities and at regular intervals. Excessive belt stretching generally indicates an overload, a belt of inferior quality or an incorrectly engineered drive and should be investigated promptly.

A large motor car manufacturer suggests that endless belts should be left slack when not in use, and cautions against the use of belt dressing. If slippage occurs which cannot be overcome by tension, the inner face of such a belt should be scrubbed with gasoline, wiped dry, and tire talc sprinkled on the belt and pulley. Excessive belt tension should be avoided at all times.

Never pry a V-belt over a sheave to get the belt in the grooves, as this may ruin the belt. It is better to loosen the engine or other bolts enough to ease the belt into the grooves without any stretch. The distance between the driving and driven sheaves can then be adjusted to produce the right tension in the belt. Manufacturers of V-belting do not approve the use of belt dressing, and experience has confirmed that it is not needed, if the belt is kept clean and is of the correct size to ride in the groove with the outside edges of the belt approximately flush with the outside edges of the groove, with the V-edge slightly above the bottom of the groove. All strands in a V-belt should be changed at one time so that all will carry the same load.

Three Types in Use

By General Inspector of Buildings

There are three types of belts in common use, the flat belt, the V-belt and the round type. While each of them is suited particularly for certain applications, they all have some characteristics in common and, with few exceptions, the things that will prolong the life of one will do the same for the others. In the first place, a belt should always be kept clean. This means to keep them free of oils, alkalis, acids and gasoline, as well as dirt and grit. If they get dirty, they should be cleaned. If a leather belt becomes oily or greasy, clean it with gasoline, but use laundry soap on rubber and canvas; in all cases wipe them clean and dry them thoroughly.

Pulleys must be in correct alinement if a belt is to give best results in service and life. Tension should be watched closely, for too much and too little tension are equally destructive of belting, while both are wasteful of power. On the other hand, a slightly loose belt will last much longer than a tight one, but care should be exercised to insure against slippage because of too little tension. A good quality of belt dressing should be used on flat belts, except on endless belts, but not on V-belts. None of the things that should be done to conserve belts is difficult, but constant care is needed to see that they are not abused.

Strengthening the Roadbed

In this period of labor shortage, to what extent is it practicable to defer the widening of embankments and the cleaning of cuts? What will be the effect of such action?

Not a Question of Men

By C. S. Robinson
Assistant Chief Engineer, Boston & Maine, Boston, Mass.

The widening of embankments and the cleaning of cuts is not the question of manpower that it was formerly, but is mostly one of equipment. If conditions on the ground require this work to be done, taking into consideration the economical maintenance of track suitable for the traffic it must carry, I certainly believe that the work should be performed. If it is deferred unduly, it may well require an expenditure of manpower well in excess of what would have been required if the widening and cleaning had been done at the proper time.

Do Not Defer

By Julius M. Bischoff
Office Engineer, Terminal Railroad Association, St. Louis, Mo.

The cleaning of cuts, where ditches are blocked, is essential and should not be deferred. If it is suitable, the material cleaned out of the cuts should be used to widen nearby embankments. Cut and other drainage ditches should be kept clear.

In general, the widening of embankments is not so essential on most roads and may be deferred without serious detriment. Slides in cuts, which do not threaten to impede drainage, may readily be deferred. However, they should be given periodic inspection and removed before they threaten the stability of the track.

Is Impracticable

By C. P. Nicholson
Assistant Chief Engineer, Norfolk Southern, Norfolk, Va.

As I view the situation, it is entirely impracticable to defer any necessary widening of embankments or cleaning of cuts. As a matter of fact, deferred maintenance in any of its phases is poor economy and it certainly is poor policy now. Even in this period of labor shortage, the railways are being called upon to handle far more traffic than was ever dreamed of during the palmiest days of peace, and the track and roadbed are receiving their most critical test. Consequently, both the track and the roadbed which supports it, must receive the most careful attention. We must see, therefore, that embankments are maintained for adequate stability and that cuts are kept clean

and drained of water at all times.

No maintenance man can visualize fully the difficulties incident to deferred maintenance of the track and roadbed until his experience has included such a situation, and this refers particularly to the subject at hand. Once a cut has been cleaned and drained adequately, it is far easier to maintain the track under traffic than it would be if the cut were allowed to get in such condition that complete rehabilitation of the track became necessary. Under average circumstances, embankments do not need widening, unless they are subject to subsidence or erosion in unstable territory. In such cases, if an established grade is to be maintained, the widening should be done quickly.

Touching on this subject is the matter of track surfacing, where a sufficient raise is made to warrant the widening of the embankments to take care of the ballast and roadbed sections. In many cases, programs of this kind may be dispensed with during these trying times without any really ill effects.

Most certainly, the manpower situation is not getting any better, and if maintenance is deferred, I am afraid that many of us will find ourselves in a serious predicament when the inevitable post-war economies are forced upon us. On the other hand, a careful study of all phases of maintenance will reveal many points where matters may be deferred to much greater advantage, with respect to the labor shortage, than by neglecting cuts and fills.

Inspecting Chimneys

To insure against failure of power plants, how often should chimneys and lightning protection be inspected? Who should make the inspection?

Must Start from Firebox

By W. C. Harman

Supervisor of Bridges and Buildings, Southern Pacific, San Francisco, Cal.

One of the most important parts of a power plant is the chimney. Its failure from any cause will have serious consequences, for which reason it should be inspected frequently, not alone by the structural supervisor, but also by a competent combustion engineer. The failure of the chimney need not be caused by structural weakness or by lightning. It may be the result of poor design, causing poor draft. For this reason, the inspection must start from the firebox. The draft should be checked carefully and a combustion test should be made so that irregularities that might cause forced draft can be corrected. This will improve the efficiency of the plant and remove the cause for the overheated chimney. The overheating of the metal in a steel stack will burn off the protective paint, exposing the metal and thus encouraging corrosion; in masonry chimneys it may cause cracks and disintegration.

In those sections of the country where lightning protection is necessary, the ground connections should be inspected and checked by the division electrical foreman, to make sure that they are in proper condition. If found defective, immediate steps should be taken to correct.

Inspection of a steel stack will generally disclose rust starting near the top and, where the stack is guyed, under the guy bands. It is important that the latter condition be noted carefully, for unless corrected, the existence of rust at these points may cause the stack to collapse eventually.

How often should the inspection be made? The frequency with which this should be done will depend in large measure on the design of the plant, and particularly on its physical condition. A semi-annual inspection should be satisfactory for a modern plant. Reports from operators of steam plants show, or should show, defects in the boilers and boiler settings. They seldom include the chimney, and it remains, therefore, for the inspector to cover this feature of the plant.

Combustion and draft are being improved by the use of checkerwork and ports in fireboxes. Modern designs are correcting deficiencies in chimneys, and the use of plastic linings is aiding in the preservation of metal stacks, as reflected in the extended life of the paint coats on the exterior surfaces.

Part of Power Plant

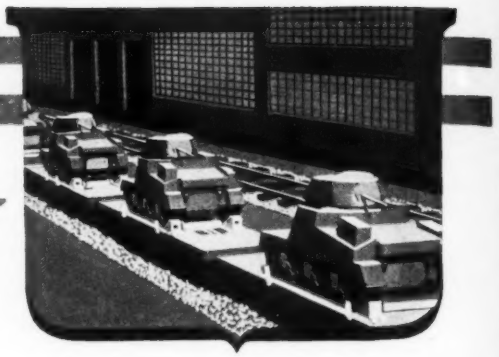
By General Inspector of Buildings

A chimney at a power plant is not just a "smoke stack" as its common designation might imply. It is an integral part of the power plant and plays as important a part in its operation and efficiency as the boiler setting, the grates, the plenum chamber, the combustion chamber or any other part of the layout. Too often, chimneys are not designed by persons who are fully informed as to their functions or aware of their limitations. For this reason, chimneys so designed are more likely to be too small than too large or, as so rarely occurs, of the correct size. At their best, such chimneys are always a source of trouble; at their worst, they may become not only a matter of serious concern to the local building officers, but they may reduce the effectiveness and efficiency of the boiler plant of which they are a part, so much that it is a complete failure. Again, chimneys are particularly susceptible to damage from lightning and should, therefore, be provided with ample lightning protection.

Because of these characteristics, the inspection should be made jointly by a building inspector, a combustion engineer and a designated representative of the electrical department. If the chimney is too small in diameter or too short to give the necessary natural draft, there is little that can be done about it, except perhaps to provide forced draft, and under many circumstances this may not be any more successful than natural draft. In such a chimney, increasing the temperature of the stack gases may improve the draft, but ruin the chimney, while lowering the temperature of the stack gases will make the draft more sluggish. If combustion continues into the breeching or into the chimney itself, the heat may cause an unlined steel chimney to buckle and collapse, or a brick chimney to expand sufficiently to crack and eventually disintegrate, besides which the waste of fuel will be high.

It is for these reasons that a competent combustion engineer should participate in the inspection, so that if any of the conditions mentioned exist, they can be corrected. If the chimney is at fault because it is too small or too short, no correction can be made, except to replace it, and this should be the joint recommendation of the building inspector and the combustion engineer. Modern plants are quite likely to have satisfactory chimneys, and they should not require inspection oftener than twice a year. Inadequate chimneys are the rule at the older plants, but most of these plants have other afflictions that need correction as much as the chimney does, and these plants should be inspected more frequently, the intervals depending on their condition as much as on the stack.

NEWS of the Month



Mexican Railroad Workers Arrive in U.S.

Following completion of an agreement between the United States and Mexico, negotiated and evidenced by the State Department of the United States and the Foreign Ministry of Mexico, for the importation of 6,000 Mexicans to become track workers on American railroads, the first consignment of 750 men has been delivered to the Southern Pacific at Nogales, Ariz., from Mexico City, and a similar consignment has been delivered to the Atchison, Topeka & Santa Fe at El Paso, Tex.

Actual recruiting of the Mexican workers, their transportation from Mexico to points in the United States, and other details relative to the undertaking are being handled by the War Manpower Commission and its subsidiary organization, the United States Employment Service, as well as the Railroad Retirement Board.

Under terms of the agreements covering the importation of these workers, their wages "shall be the same as those paid for similar work to domestic workers at the place of employment. In no case shall the wages be less than 46 cents (U.S. currency) per hour." The agreements also provide that "any overtime shall be at the same rate paid to domestic workers doing similar labor."

New Prices on Used Rail and Track Accessories

Warehouse prices for relaying rail were advanced and specific prices established for used railroad track accessories under the Office of Price Administration's Maximum Price Regulation 46, effective May 1. Prices at warehouses for relaying rail weighing 60 lb. or more per yd. when new, are increased $3.84 per gross ton in carload lots, with a quantity limitation to not more than two carloads on rail weighing more than 70 lb. per yd. The increase is not justified on larger quantities of the heavier rail, the OPA said. The previous price was $32 per gross ton.

Used track accessories are priced in the regulation from 10 to 30 per cent below mill prices for new accessories. For track accessories originating from Class I railroads and switching or terminal companies, f.o.b. any station on the selling road, the prices per 100 lb. are: joint bars, $1.85; tie plates, $1.50; track bolts and nuts, $3.50; track spikes, $2.70. Dealers or jobbers on direct shipments from Class I roads may sell used track accessories at prices 25 cents per 100 lb. above those figures, and other specific prices are set in the regulation for the same articles sold from warehouses.

Eastman Appointed to War Production Board

Transportation is now represented on the War Production Board by Joseph B. Eastman, director of the Office of Defense Transportation, who was recently appointed one of three additional members of the board by President Roosevelt. The other two new appointees are Paul V. McNutt, chairman of the War Manpower Commission, and Petroleum Administrator for War, Harold L. Ickes.

A Troop Train Every Six Minutes

Transportation of troops by rail has been stepped up to the point where a special troop movement is being started somewhere in the United States about every six minutes during the day and night, Major General Charles P. Gross, chief of the Army Transportation Corps, revealed May 8 during a round-table discussion over the network of the National Broadcasting Company.

At the present time, General Gross said, the railroads are carrying in organized parties approximately two million members of the military forces a month. He pointed out that the job of transportation in this war is not only bigger but also more difficult than it was in the first World War.

Budd Sees Need For Rail As Pressing

Railroads are operating close to their maximum capacity and must have new rails, more motive power and additional cars to avoid serious congestion of wartime traffic, Ralph Budd, president of the Chicago, Burlington & Quincy told stockholders at the annual meeting of the railroad at Chicago on May 5. He said that the need for rail is critical and that there is no compromise with a broken rail.

"You can make cars last a little longer, and you can make locomotives run a little longer but when a rail fails there is nothing to do but put in a new rail," he said. "The extremely severe use of the railway plant has caused rails to become perhaps the most critical of all our material problems and if the war lasts long it will be imperative that more new rail be laid to carry on safely with the constantly growing burden of traffic."

Recommends 8-Cent Wage Increase for Non-Operating Employees

On May 26, an emergency board of the National Railway Labor panel recommended a general increase of 8 cents an hour for the employees of the 15 so-called non-operating railway unions. The unions had requested an increase of 20 cents an hour, with a minimum wage of 70 cents an hour and a closed shop. The board declined to make recommendations on the latter two demands.

The board stated in its report that the increases are not based on the Little Steel formula of the War Labor Board, but are within the National Stabilization program and are "the minimum non-inflationary adjustments necessary to correct gross inequities and to aid in the effective prosecution of the war." The report of the emergency board is not subject to action by the War Labor Board, but is subject to review by Stabilization Director James F. Byrnes. Unless he modifies the recommendations of the emergency board, an executive order provides that they will become effective 30 days after they are filed with the President.

Widespread Floods Affect Many Railways

Floods beginning about the middle of May in 14 rivers in six states, and which have not yet abated, have interfered seriously with traffic on 16 railways, although they have as yet caused little physical damage, compared with other floods of no greater magnitude. Lines of the Illinois Central between Effingham, Ill., and Indianapolis, Ind.; between Murphysboro, Ill., and Thebes; and of the Missouri Pacific between Dupo, Ill., and Thebes have been submerged at various points by floods in the Wabash and Mississippi rivers, while the Missouri Pacific's large terminal yard at Dupo is also submerged. Six miles of the St. Louis-Kansas City line of the Chicago, Rock Island & Pacific along the Osage river is under 13 ft. of water near Meta, Mo. The tracks of the Chicago, Milwaukee, St. Paul & Pacific have been under 6 to 8 ft. of water at Terre Haute, Ind. Other lines on which service has been suspended for periods ranging from one or two days to a week are the Baltimore & Ohio at Lawrenceville, Ill.; the Wabash, the Chesapeake &

Ohio and the Cleveland, Cincinnati, Chicago & St. Louis at Wabash, Ind., and Peru; the C. C. C. & St. L., at Mt. Carmel, Ill.; the Chicago, Burlington & Quincy at Beardstown, Ill., and between Hannibal, Mo., and St. Louis; the Chicago & Eastern Illinois, between Montezuma, Ind., and Vincennes; the Peoria & Pekin Union, at Peoria, Ill.; the Terminal Railroad Association's Line to the Merchants Bridge at St. Louis; the Missouri-Kansas-Texas at Eufaula, Okla., and other points along the Verdigris river; the St. Louis-San Francisco, at Cape Girardeau, Mo., and between Holdenville, Okla, and McAllister; and the Kansas City Southern, at the crossing of the Arkansas river. In addition, washouts have occurred at numerous points far removed from the more seriously flooded areas.

Eastman Seeks Greater Railway Efficiency

Declaring that still greater efficiency in the operation of the nation's railroads must be attained to offset wartime shortages of steel and other critical materials, Joseph B. Eastman, director of the Office of Defense Transportation, recently reported that, with the exception of freight cars and rail, materials allocated by the requirements committee of the W. P. B. for the third quarter of 1943 will meet the minimum of domestic transportation for both maintenance and equipment.

Referring to the reduction in the third quarter rail program, Mr. Eastman said: "The rail situation is being watched closely by this office. Should the amount of steel for this purpose prove inadequate to maintain the roads at reasonable operating standards, further steps will have to be taken. Obviously, rail cannot be allowed to deteriorate beyond a certain point before being replaced.. I shall pursue this matter, and also construction of additional freight cars, with the War Production Board."

New Record Oil Movement to the East

A new high in the transportation of oil to the East was established during the week ending May 15, when the delivery of petroleum and petroleum products in tank cars by the railroads averaged 980,652 bbl. per day. This record approaches closely the volume of 1,000,000 bbl. a day which it is anticipated will be reached as a result of new and improved schedules. The previous high record was an average of 965,582 bbl. per day set in the week ending May 8 and the high record in 1942 was 856,710 bbl. for the week ending September 19.

While the railroads expect soon to deliver 1,000,000 bbl. per day, this record may be impossible of achievement for several weeks, since train schedules in six middle western states have recently been seriously disrupted by floods and high water, as reported elsewhere in these columns. The delivery of oil to the East was also seriously handicapped for about a week by the breaking of the "Big Inch" pipe line to Norris City, Ill., laid last year, where it crossed the Arkansas river near Little Rock, Ark. Service was restored by laying an emergency pipe line on a Rock Island railway bridge over the river.

Personal Mention

General

Leonard B. Allen, assistant to the president of the Chesapeake & Ohio, the New York, Chicago & St. Louis, and the Pere Marquette, and an engineer by training and experience, has been promoted to assistant vice-president-assistant to the president of the Chesapeake & Ohio at Cleveland, Ohio.

William H. Hobbs, engineering assistant to the chief executive officer of the Missouri Pacific, has been appointed director of research, with headquarters as before at St. Louis, Mo., a newly-created position. Mr. Hobbs was born at Gatesville, Tex., on February 12, 1892, and graduated in science and civil engineering from the Oklahoma Agricultural and Mechanical College in 1912. He entered railway service on July 1, 1912, as a rodman on the St. Louis, Iron Mountain & Southern (now the Missouri Pacific), subsequently serving at various points as instrumentman and assistant engineer until 1917, when he joined the U. S. Army. From March, 1919, to January, 1925, Mr. Hobbs served the Missouri Pacific as assistant engineer at Monroe, La., and Kansas City, Mo., and in the chief engineer's office at St. Louis. In February, 1925, he was promoted to engineer of design, with headquarters at St. Louis, and in January, 1937, he was appointed engineering assistant to the chief executive officer, holding that position until his new promotion became effective on April 1.

William H. Hobbs

R. C. Miller, assistant chief engineer of the Pennsylvania, has been appointed comptroller, with headquarters as before at Philadelphia, Pa. Mr. Miller was born at Zanesvile, Ohio, in 1878, and graduated in civil engineering from Ohio State University in 1901. While at college he worked during summer vacations on the Pennsylvania as an assistant on the Zanesville division engineering corps. Entering the permanent service of the railroad as an engineering corps assistant at Pittsburgh in 1901, Mr. Miller subsequently served in engineering posts on the Indianapolis, Marietta, Logansport, Toledo, St. Louis and Chicago Terminal divisions of the Western lines and on the Philadelphia and New York divisions in the east. He was advanced to superintendent of the Schuylkill division in 1926 and was subsequently transferred to the Toledo and Columbus divisions. From 1930 to 1931 he was acting assistant chief engineer, with headquarters at Philadelphia, and was appointed general superintendent of the Southwestern division at Indianapolis, Ind., in the latter year, later being transferred to Pittsburgh, Pa. In 1940 Mr. Miller became assistant chief engineer at Philadelphia, the position he held until his recent appointment.

R. C. Miller

Paul J. Neff, assistant chief traffic officer-passenger, of the Missouri Pacific, and vice-president and general manager of the Missouri Pacific Transportation Company (motor transport subsidiary), at St. Louis, Mo., and engineer by training and experience, has been promoted to senior executive assistant in charge of the Gulf Coast Lines and the International-Great Northern (Texas lines of the Missouri Pacific) and executive assistant of the Missouri Pacific, with headquarters at Houston, Tex. Mr. Neff was born at St. Louis, Mo., on July 14, 1884, and graduated in civil engineering from the University of Kansas in 1906. He ob-

Paul J. Neff

tained his first railway experience in February, 1907, as a rodman on the St. Louis-San Francisco at Joplin, Mo. Later he served as transitman and assistant engineer at Springfield, Mo., as assistant engineer and engineer of construction at Memphis, Tenn., St. Louis and Springfield, and as district engineer at the latter point. From September, 1918, to December, 1919, he was corporate chief engineer of the Frisco, during federal control of the railroads. From January, 1920, to December, 1922, he served successively as general manager of the Wichita Falls, Ranger & Fort Worth and the Wichita Falls & Southern at Ranger, Tex., and as chief engineer of the Texas lines of the Frisco at Fort Worth, Tex. Mr. Neff then became assistant to the president of the International-Great Northern at Houston, and later served as assistant executive vice-president at Houston, general superintendent of the Eastern district of the Missouri Pacific at St. Louis, and assistant to the president. In May, 1931, he was promoted to assistant vice-president in charge of passenger traffic, and in February, 1934, he was appointed assistant chief traffic officer-passenger, one of the three titles he held at the time of his new appointment, effective May 1.

James P. Newell, Jr., whose promotion to superintendent of freight transportation of the Western region of the Pennsylvania, with headquarters at Chicago, was reported in the April issue, was born at Carthage, Mo., on September 18, 1902. He graduated from Princeton University in 1924 and entered railway service in 1927 as an assistant on the engineering corps of the Pittsburgh division of the Pennsylvania. The following year he was promoted to assistant supervisor of track at Sharpsburg, Pa. In December, 1928, he was transferred to Carnegie, Pa., and in July, 1929, he was promoted to supervisor of track on the Buffalo division, with headquarters at East Aurora, N.Y. Mr. Newell later served as supervisor of track on the E. & A., the Pittsburgh, the Middle and the Maryland divisions, being located at Wilmington, Del., in May, 1934, when he was promoted to assistant division engineer of the Middle division, with headquarters at Altoona, Pa. In July, 1937, he was transferred to the office of the vice-president, operation, at Philadelphia, Pa., and in March, 1938, he was advanced to division engineer of the Long Island railroad, with headquarters at Jamaica, N.Y. In May, 1940, Mr. Newell was advanced to superintendent of the Logansport division, with headquarters at Logansport, Ind., and on February 16, 1942, he was transferred to the St. Louis division, with headquarters at Terre Haute, Ind., remaining in that location until his new appointment.

Engineering

William D. Wiggins, vice-president—engineering of the Pennsylvania at Philadelphia, Pa., has retired after 48 years railroad service. Mr. Wiggins became vice-president on February 1 of this year, and his photograph and a biographical sketch of his railway career were published in the March issue.

John C. Jacobs, whose promotion to division engineer on the Illinois Central, with headquarters at Water Valley, Miss., was reported in the April issue, was born on August 3, 1892, at Amboy, Ill. After studying for a year at the University of Illinois, Mr. Jacobs entered railway service with the Illinois Central in February, 1912, serving as a chainman, rodman and instrumentman on construction and maintenance until February 1, 1917. On that date he left railway service to enter the employ of a contractor, later serving with the Miami Conservancy District at Dayton, Ohio, and with the Chicago, Burlington & Quincy as assistant engineer in the valuation department. He returned to the Illinois Central in November, 1918, as an instrumentman, being appointed an assistant engineer in the construction department in February, 1923. From June, 1926, to September, 1931, he served as an assistant engineer on the St. Louis division, then being appointed an instrumentman on the same division. From April to October, 1936, he served as acting track supervisor on the Springfield division, then returning to the position of instrumentman. On June 10, 1937, Mr. Jacobs was appointed track supervisor on the Springfield division. On July 1, of the same year, he was promoted to supervisor of trains and track, with headquarters at Decatur, Ill., holding that position until his new appointment became effective on April 1.

John C. Jacobs

Byron J. Hogan, whose promotion to assistant division engineer on the Coast division of the Southern Pacific, with headquarters at San Francisco, Cal., was reported in the April issue, was born at Sacramento, Cal., on December 18, 1897, and graduated from the Christian Brothers college in June, 1916. He entered railway service in the same year, serving as a rodman and instrumentman on the S. P., and in 1919 he became a rodman on the Northwestern Pacific (now a subsidiary of the Southern Pacific). From March, 1921, to March, 1923, Mr. Hogan served as valuation engineer of the city of San Francisco and draftsman for the California Highway commission, returning to the S. P., on the latter date and subsequently serving as an assisant engineer on the Western division. In January, 1940, he was promoted to engineer in charge of the Inter Urban Electric (at that time owned by the Southern Pacific) and in September, 1941, he was appointed special assistant engineer assigned to a committee to study freight handling at the Oakland (Cal.) terminal. In December, 1941, he returned to the Inter Urban Electric and in 1942 he was appointed assistant engineer on the chief engineer's staff, holding that position until his new promotion, effective February 1.

Roy W. Putnam, whose promotion to assistant engineer maintenance of way and structures of the Southern Pacific with headquarters at San Francisco, Cal., was reported in the May issue of *Railway Engineering and Maintenance*, was born at Buffalo Gap, S.D., on March 23, 1888, and attended South Dakota State Normal College and Colorado College, graduating in civil engineering from the latter in 1912. He entered railway service with the Southern Pacific on August 1, 1912, as an axman on construction at Eugene, Ore., and a year later he was promoted to instrumentman. In 1917, he was transferred to the maintenance of way department of the San Joaquin division at Bakersfield, Cal., and in 1919, he was promoted to assistant engineer of the Portland division, with headquarters at Portland, Ore. In 1922,

Roy W. Putnam

Mr. Putnam was appointed general foreman in the maintenance of way department of the Portland division. In October, 1925, he was appointed assistant engineer in charge of the construction of the yard and timber treating plant at Eugene, and in June, 1926, he was promoted to roadmaster at that point. Mr. Putnam was transferred to Oakridge, Ore., in October, 1928, and in November, 1937, he was promoted to assistant division engineer, with headquarters at Portland. On November 1, 1940, he was advanced to the position he held at the time of his new appointment, effective April 1.

Crosby Miller, whose promotion to assistant chief engineer of the Chesapeake & Ohio, with headquarters at Richmond, Va., was reported in the April issue, was born on September 1, 1881, at San Francisco, Cal. Mr. Miller graduated from the University of California in 1904, and entered the employ of the Phoenix Bridge Company at Phoenixville, Pa., during the same year. He subsequently was em-

ployed successively by the New York Central at New York; by C. W. Hudson, consulting engineer, at New York; and by the Pennsylvania Steel Co., at Steelton, Pa. Mr. Miller entered railroad service in 1914 as bridge engineer of the Chesapeake & Ohio and remained in that position until his recent appointment as assistant chief engineer.

John A. Lorch, whose retirement as assistant to the chief engineer of the Chicago & North Western at Chicago was reported in the April issue, was born at Pleasant Branch, Wis., on November 23, 1876, and attended the University of Wisconsin. He entered railway service in 1901 with the Illinois Central, serving successively as rodman, instrumentman and resident engineer. In 1905 he went with the North Western as a resident engineer, later being advanced successively to assistant engineer, and to assistant engineer, valuation, with headquarters at Chicago. In the latter part of 1926, Mr. Lorch was appointed valuation engineer and in November, 1940, he was appointed assistant to the chief engineer, which position he held until his retirement.

L. R. Lamport, whose promotion to assistant to the chief engineer of the Chicago & North Western, and the Chicago, St. Paul, Minneapolis & Omaha, was reported in the April issue of *Railway Engineering and Maintenance*, was born in Chicago on September 29, 1899, and graduated from the University of Illinois in 1923. He entered railway service between terms of school in June, 1920, as a rodman on the North Western at Chadron, Neb., later serving during summer vacations and after graduation as tapeman, rodman, instrumentman and inspector. In March, 1925, he went with the Illinois Central, serving as a rodman on location

L. R. Lamport

and maintenance, and in September, 1927, he returned to the North Western as an engineering accountant at Chicago. Mr. Lamport was promoted to assistant engineer on the Galena division in November, 1928, and in September, 1937, he was appointed supervisor of work equipment, with headquarters as before at Chicago. On April 1, 1940, he was promoted to division engineer of the Northern Iowa and Sioux City divisions, with headquarters at Sioux City, Iowa, and on December 1, 1940, he was transferred to the Galena division at Chicago.

Earl M. Unzicker, whose promotion to division engineer of the Eastern division of the Alton, with headquarters at Bloomington, Ill., was reported in the April issue of *Railway Engineering and Maintenance*, was born at Holyoke, Colo., on September 19, 1888, and attended the University of Illinois. He entered railway service in 1904 as a clerk in the general storekeeper's office of the Chicago & Alton (now the Alton) and in 1911 he was appointed rodman and later instrumentman, with headquarters at Bloomington, Ill. In 1919 Mr. Unzicker was promoted to chief draftsman at Chicago, and one year later he became assistant engineer on the Peoria & Pekin Union. In 1923 he served in the valuation department of the Chicago, Milwaukee, St. Paul & Pacific, and in 1923 he was appointed designer and assistant engineer on the Illinois Central. In 1932 he was granted leave of absence to engage in several projects on the Alton, returning to the I. C. as masonry inspector two years later. Mr. Unzicker returned to the Alton in 1935 and was promoted to assistant division engineer in 1939, holding that position until his new appointment, effective March 16.

Earl M. Unzicker

Roger W. Speidel, whose promotion to division engineer of the Indianapolis division of the Pennsylvania with headquarters at Indianapolis, Ind., was reported in the March issue, was born at Cleveland, Ohio, on January 3, 1907, and graduated from Purdue University in 1929. He entered railroad service in that year as assistant in the engineer corps of the Pennsylvania at Huntingdon, Pa., and held similar positions on various divisions until 1933 when he was promoted to assistant supervisor, with headquarters at Morristown, Pa. Later he was transferred to Harrington, Del.; Enola, Pa.; Washington, D.C.; Jersey City, N.J., and New Brunswick. In 1935 Mr. Speidel was advanced to acting supervisor at Atlantic City, N.J., being transferred one year later to Washington. On February 1, 1936, he was promoted to supervisor of track on the Monongahela division, with headquarters at Homestead, Pa., and in July, 1937, was transferred to the Philadelphia division, with headquarters at Downingtown, Pa., holding that position until his new appointment, effective February 4.

J. R. Scofield, assistant engineer in the district engineer's office of the New York Central at Cleveland, Ohio, has been promoted to division engineer of the Illinois division, with headquarters at Mattoon, Ill., succeeding **H. E. Woodburn** who has been appointed superintendent of the Dayton (Ohio) Union Terminal. **A. A. Keever,** assistant engineer in the division engineer's office at Chicago, has been advanced to assistant engineer in the district engineer's office at Cleveland, succeeding Mr. Scofield.

Donald E. Rudisill, division engineer on special duty in the office of the chief engineer of the Pennsylvania at Philadelphia, has been promoted to engineer of maintenance of way of the Western Pennsylvania division, with headquarters at Pittsburgh, Pa. Mr. Rudisill was born at Mt. Carmel, Pa., and entered the service of the Pennsylvania in March, 1923, as a rodman in the office of the division engineer of the New York division at Jersey City, N.J. Mr. Rudisill subsequently served in that capacity and as assistant supervisor of track, successively, on the New York, Philadelphia, Middle and Baltimore divisions, until he was appointed

Donald E. Rudisill

supervisor of track on the Monongahela division in August, 1929. In December, 1930, he was assigned to special duty in the office of the chief engineer of the system at Philadelphia, Pa., and in April, 1932, he became supervisor of track on the Buffalo division, later being transferred to the Panhandle division. In November, 1938, he was appointed division engineer on the Monongahela division, and subsequently was transferred to the St. Louis division and then to the New York division. In April, 1942, Mr. Rudisill was assigned to special duty in the office of the chief engineer at Philadelphia, the position he held at the time of his recent appointment.

Herbert Fisher, whose promotion to assistant division engineer of the Southern Pacific Lines in Texas & Louisiana, with headquarters at Austin, Tex., was reported in the April issue, was born at New Braunfels, Tex., on January 16, 1891, and

received his technical education at Texas A. & M. college. He entered railway service in 1910 as a chairman on the Kansas City, Mexico & Orient (now controlled by the Atchison, Topeka & Santa Fe), being subsequently promoted to rodman and instrumentman. Later Mr. Fisher became engaged in highway engineering and in 1914 he was associated with an irrigation project on the upper Colorado River in Texas. In 1916 he became an instrumentman for the Gulf, Colorado & Santa Fe (part of the Santa Fe system) and in December of that year he was appointed an instrumentman on the Southern Pacific, serving as assistant engineer and roadmaster until his new appointment.

Maurice B. Clark, district engineer on the Atchison, Topeka & Santa Fe, has been promoted to assistant chief engineer, Coast lines, assigned to special duties, with headquarters as before at Los Angeles, Cal. **R. E. Chambers,** division engineer of the Los Angeles division with headquarters at San Bernardino, Cal., has

Maurice B. Clark

been advanced to district engineer at Los Angeles, succeeding Mr. Clark, and **L. E. Smith,** assistant division engineer at San Diego, Cal., has been appointed acting division engineer, replacing Mr. Chambers. **N. A. Richards,** transitman at San Diego, Cal., has been promoted to acting assistant division engineer succeeding Mr. Smith. **J. L. Hopkins,** assistant roadmaster, has been advanced to construction roadmaster, with headquarters as before at Fullerton, Cal., a newly-created position.

Mr. Clark was born at Cleveland, Ohio, on July 27, 1885, and graduated from Princeton University in 1908. He entered railway service in 1910 as a rodman on the Santa Fe, subsequently serving as transitman, instrumentman and assistant engineer. In 1915 Mr. Clark was pilot on federal valuation work on the Santa Fe lines and in 1917 he was advanced to resident engineer in charge of second track construction from Goffs, Cal., to Bagdad. In the same year he was promoted to division engineer at Needles, Cal., and four years later he was transferred to San Bernardino, Cal. On February 1, 1941, Mr. Clark was advanced to district engineer.

Carroll K. Hoffmeister, assistant engineer, water supply, of the Texas & Pacific, has been promoted to engineer, water supply, with headquarters at Dallas, Tex., succeeding **R. L. Holmes,** whose death on April 26 is reported elsewhere in these columns.

R. E. Peck has been appointed bridge engineer of the Gulf, Mobile & Ohio, with headquarters at Mobile, Ala.

H. N. Huntsman has been appointed chief engineer of the Litchfield & Madison, with headquarters at Edwardsville, Ill., succeeding **R. L. Longshore,** who has retired.

J. E. Spangler, assistant supervisor of track on the New York Central at Syracuse, N.Y., has been appointed assistant engineer in the office of the engineer of track of the Lines East of Buffalo, with headquarters at New York.

A. D. Kerr, assigned to special duty in the office of the general real estate office of the Pennsylvania, with headquarters at Philadelphia, has been promoted to branch line supervisor—construction—of the Columbus division, a newly-created position.

R. S. Stephens, division engineer on the Decatur division of the Wabash at Decatur, Ill., has been promoted to supervisor of work equipment, with headquarters at St. Louis, Mo. **J. F. Nellis,** has been appointed division engineer of the Decatur division, succeeding Mr. Stephens.

Howard K. Carter, assistant engineer on the New York Central at Mattoon, Ill., has been promoted to assistant division engineer, with headquarters at Bellefontaine, Ohio, succeeding **W. W. Rohrbough,** whose promotion to division engineer at Springfield, Ohio, was reported in the May issue.

Track

R. J. McEwen, supervisor of track on the New York Central at Corning, Ohio, has been transferred to Bryan, Ohio.

H. C. Blanchard, roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, has transferred his headquarters from Spencer, Iowa, to Algona.

A. B. Peterson has been appointed assistant supervisor of track on the Pittsburgh & Lake Erie, with headquarters at McKeesport, Pa., effective April 1.

W. R. Baker has been appointed roadmaster of the Pecos division of the Atchison, Topeka & Santa Fe, with headquarters at Clovis, N.M., a newly-created position.

R. O. Irwin, assistant to the chief engineer of the Denver & Rio Grande Western, has been appointed supervisor of terminals, with headquarters as before at Denver, Colo.

G. Larson, roadmaster on the Canadian Pacific at Cranbrook, B.C., has been transferred to Brandon, Man. **O. Otherson,** roadmaster at Lake Windermere, B.C., has been transferred to Cranbrook, succeeding Mr. Larson, and **E. Johnson,** roadmaster at Brookmere, B.C., succeeds Mr. Otherson at Lake Windermere. **E. Burlon,** roadmaster at Hope, B.C., has been transferred to Brookmere, succeeding Mr. Johnson.

E. K. Pearson, assistant roadmaster on the Chicago & North Western at Mason City, Iowa, has been promoted to roadmaster of Sub-division No. 2, of the Madison division, with headquarters at Madison, Wis., succeeding **F. C. Hajek,** who has been transferred to Sub-division No. 1, with the same headquarters, replacing **George Mathiasen,** who has retired.

J. J. Desmond, supervisor of track on the Illinois Central at Freeport, Ill., who has been on a leave of absence because of illness, has returned to his duties at Freeport, succeeding **W. N. Rice,** acting supervisor of track, who has been promoted to supervisor of track at Waterloo, Iowa. Mr. Rice relieves **John F. Brosnahan,** who has been transferred to Mattoon, Ill., replacing **Wayne Smith,** who has been granted a leave of absence for military service.

J. C. Neff, a draftsman in the office of the engineer maintenance of way of the New York Central, Lines East of Buffalo, with headquarters at New York, has been promoted to assistant supervisor of track of Subdivision 28 of the Electric division, with the same headquarters, succeeding **Robert J. Klueh,** who has been transferred to Subdiviison 9 of the Syracuse division, with headquarters at Syracuse, N.Y., succeeding **J. E. Spangler,** whose appointment as assistant engineer at New York is noted elsewhere in these columns.

L. B. Craig, assistant roadmaster on the St. Louis-Louisville division of the Southern at Louisville, Ky., has been promoted to roadmaster of the Mobile division, with headquarters at Selma, Ala., succeeding **W. C. Morris,** who has been appointed a lieutenant-colonel of the Transportation Corps, stationed at Fort Slocum. **C. W. Russell,** supervisor on the St. Louis-Louisville division at Centralia, Ill., has been advanced to assistant roadmaster at Louisville, replacing Mr. Craig, and **J. B. Hutcherson,** assistant supervisor on the Alabama Great Southern (part of the Southern system) at Tuscaloosa, Ala., has been promoted to supervisor on the St. St. Louis-Louisville division at Centralia, succeeding Mr. Russell.

W. O. Ritchey, whose promotion to track supervisor on the Atlanta division of the Nashville, Chattanooga & St. Louis was reported in the April issue, entered railway service in 1918 as a laborer on the N. C. & St. L., and was promoted to assistant section foreman in 1920. Two years later he was advanced to section foreman. Since then Mr. Ritchey has served as section foreman or extra foreman until his new appointment, effective April 1.

Leonard T. Anderson, whose promotion to roadmaster of the Union Pacific, with headquarters at Gering, Neb., was reported in the April issue, was born at Cozad, Neb., and entered railway service on June 1, 1926, as a section laborer on the U. P. From 1927 to 1936 he held similar positions at various points on that

(Continued on page 466)

road, and on March 1, 1937, he was promoted to tie gang foreman. Mr. Anderson subsequently served as assistant foreman and relief foreman, and on March 10, 1942, he was advanced to assistant roadmaster on the Nebraska division, holding that position until his new appointment.

John F. Brosnahan, whose promotion to track supervisor on the Illinois Central, with headquarters at Waterloo, Iowa, was reported in the April issue, was born at Pontiac, Ill., on May 3, 1908, and entered railway service as a section laborer on the I. C., on June 3, 1925. In 1929 he was advanced to assistant foreman at Loda, Ill., and two years later he was promoted to section foreman, with headquarters at Edgewood, Ill. From March 1, 1937, to April, 1942, Mr. Brosnahan served as extra gang foreman and general foreman at Champaign, Ill., and was advanced to acting supervisor of track on January 1, 1943, with headquarters at Gilman, Ill.

James T. McCarthy, general foreman on the Erie, whose promotion to supervisor of track was announced in the March issue, was born on August 25, 1910, at Buffalo, N.Y. He entered railway service with the Erie on December 16, 1926, serving as clerk for the track supervisor and assistant chief clerk to the division engineer at Buffalo until June 1, 1930. On that date, Mr. McCarthy was promoted to section foreman, which position he held at Buffalo, Niagara Falls and Lancaster, N.Y. On April 12, 1941, he was further advanced to general foreman, with headquarters at Jersey City, N.J., which position he was holding at the time of his recent promotion to supervisor of track.

James G. Ainey, who has been appointed track supervisor on the Erie, with headquarters at Jamestown, N.Y., as reported in the March issue, was born on July 30, 1906, at Scranton, Pa., and attended Rensselaer Polytechnic Institute, Troy, N.Y. He entered railway service with the Erie in April, 1929, and held such positions as carpenter, assistant foreman, levelman, transitman and chief of the curve lining corps on various divisions until October, 1940. At that time he became head of corps in the joint office of the division engineers of the New York and Terminal divisions at Jersey City, N.J. On August 1, 1941, Mr. Ainey was appointed general foreman at Buffalo, N.Y., which position he was holding at the time of his recent promotion to track supervisor of Subdivision No. 1 of the Meadville division at Jamestown.

John J. Maher, who has been appointed supervisor of track on the Pennsylvania at Trenton, N.J., as reported in the March issue, was born on February 20, 1912, at Philadelphia, Pa., and obtained his higher education at Trinity College, Hartford, Conn. He entered railway service with the Pennsylvania on September 3, 1935, as a signal apprentice on the Middle division, later serving in the same capacity on the Baltimore and Philadelphia Terminal divisions. In December, 1939, he became an assistant on the engineer corps of the Williamsport division, with headquarters at Northumberland, Pa., and in April, 1940, he was further advanced to assistant supervisor of track on the Eastern division at Mansfield, Ohio. Subsequently, Mr. Maher served in the same capacity on the Panhandle division at Carnegie, Pa., and Coshocton, Ohio. His promotion to supervisor of track on the New York division at Trenton became effective on February 15.

Special

F. A. Williams, roadmaster of the Chicago, Rock Island & Pacific, with headquarters at Fairbury, Neb., has been promoted to assistant superintendent of work equipment, with headquarters at Chicago, a newly-created position.

Bridge and Building

H. E. Davis, supervisor of bridges on the New York Central at Chicago, has been advanced to supervisor of bridges and buildings, with the same headquarters, a newly-created position.

F. L. Lee, assistant master carpenter on the New York division of the Pennsylvania, has been promoted to master carpenter of the Cincinnati division, with headquarters at Cincinnati, Ohio, succeeding **G. W. Guyton,** who has retired.

William M. Paige, whose promotion to bridge and building master on the Canadian National at Kamloops, B.C., was reported in the March issue, joined the Canadian Northern (now part of the Canadian National) as a bridge carpenter in 1911 and in 1915 was promoted to bridge foreman on the Edmonton division. In 1940 he was appointed roadmaster at Edmonton, Alta.

H. F. Bird, whose promotion to supervisor of bridges and buildings of the Syracuse division of the New York Central, with headquarters at Syracuse, N.Y., was reported in the April issue, was born on January 21, 1897, at Overton, Pa., and is a graduate of Bucknell university. He entered railway service with the New York Central on June 16, 1924, as a chainman in the engineering department, with headquarters at Jersey Shore, Pa. While serving at Jersey Shore, Mr. Bird was advanced to rodman on July 16, 1924, to transitman on September 16, 1929, and to bridge and building inspector on April 1, 1934. He was further promoted to assistant supervisor of bridges and buildings, with headquarters at Syracuse, on January 1, 1942.

Obituary

R. L. Holmes, engineer of water supply of the Texas & Pacific, with headquarters at Dallas, Tex., died at Sanatorium, Tex., on April 26, following a brief illness.

John L. Downs, former district engineer of the Northern lines of the Illinois Central, who retired in 1940 as superintendent of the Illinois division of that road, died at Champaign, Ill., on May 17.

Charles W. Anderson, who retired in 1938 as roadmaster on the Southern at Greensboro, N.C., died at Greensboro on April 22.

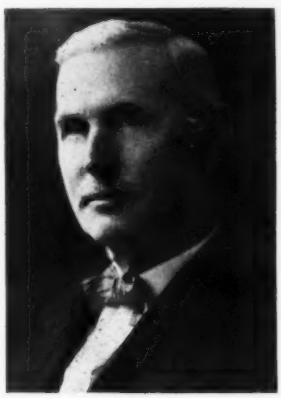
Walter B. Harris, roadmaster on the Gulf, Mobile & Ohio, at Jackson, Tenn., died at his home in that city on April 29, following a short illness.

Charles W. Tyson, who retired in October, 1931, as roadmaster on the Canadian National at Melville, Sask., died on March 15 at Melville at the age of 80.

Wiley W. Reeder, who retired in 1940 as track supervisor on the Louisville & Nashville, with headquarters at Evansville, Ind., died on March 23, at Evansville.

George P. Williams, who at one time served as engineer maintenance of way of the Long Island at Jamaica, N.Y., died on May 2, at his home in Garden City, N.Y., at the age of 65.

William Shea, who retired in 1941 as superintendent of track maintenance of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, died on May 13 at Iowa City, Iowa. Mr. Shea



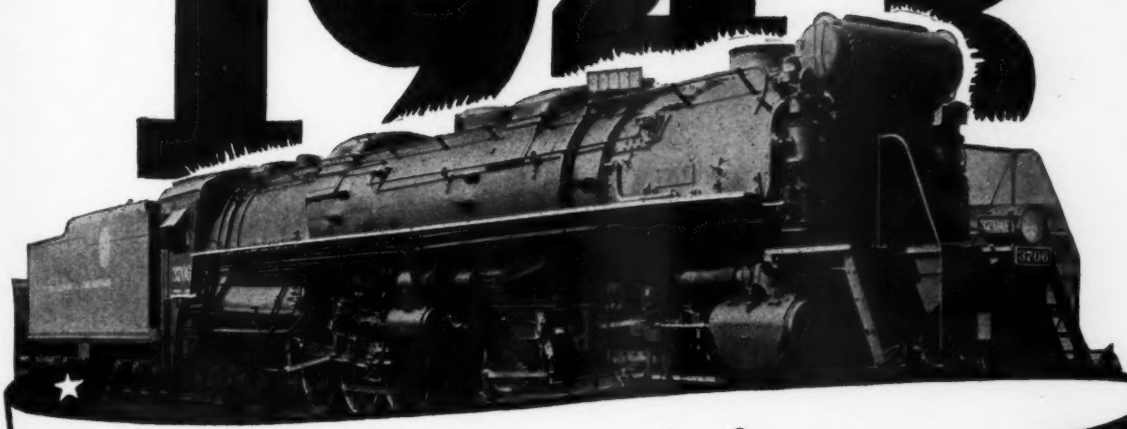
William Shea

was born at Eddyville, Iowa, on August 31, 1867, and entered railway service in 1881 as a water boy on the construction of the Humeston & Shenandoah (now part of the Chicago, Burlington & Quincy) in southwestern Iowa. He later served as foreman of a construction gang for the Milwaukee on the construction of the line between Cedar Rapids, Iowa, and Ottumwa. On November 1, 1884, he was appointed section foreman on the same line at North English, Iowa, and in August, 1887, he was promoted to extra gang foreman on the Kansas City division. Mr. Shea was advanced to roadmaster on the Chicago & Council Bluffs division in 1890, and on January 1, 1891, he was appointed roadmaster on the Middle district of the Kansas City division, with headquarters at Blakesburg, Iowa. In July, 1918, he was further advanced to general roadmaster of the Milwaukee system, with headquarters at Chicago. In January, 1930, Mr. Shea was appointed assistant engineer of maintenance of way, and on May 1, 1935, his title was changed to superintendent of track maintenance, the position he held until his retirement on May 1, 1941. Mr. Shea was long active in the Roadmasters and Maintenance of Way Association, of which organization he was president in 1913.

(Continued on page 468)

It's Full Speed Ahead For

1943



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Association News

Track Supply Association

Meeting in Chicago on May 18, the Board of Directors of the association voted to forego further exhibits in conjunction with the Annual meetings of the Roadmaster's Association for the duration of the war, including the exhibit in September. It based its action in this regard upon the shortage of materials and equipment, making it difficult to present the usual constructive exhibits; the intensive preoccupation of railway supervisory officers with their current maintenance problems, which might limit attendance; and a desire to co-operate with the railroads in minimizing passenger travel on trains.

Railway Tie Association

More than 75 railway officers and executives and other representatives of tie producing companies gathered at St. Louis, Mo., on May 4, for the Twenty-fifth Annual meeting of the Railway Tie Association, which, this year, was confined to one day. The program was directed entirely to problems affecting tie production, resulting from the impact of war conditions. Owing to the curtailed program, all except two of the usual addresses were dispensed with, the two addresses given being presented at the annual luncheon and at the annual dinner. R. M. Claytor, plant manager, Southern Wood Preserving Company, Chattanooga, Tenn., was elected president, and Roy M. Edmunds was re-elected secretary-treasurer.

American Railway Enginering Association

Two standing committees of the association held meetings in May, and only one has thus far scheduled a meeting in June. The Committee on Rail met in Chicago on May 11, the Committee on Records and Accounts met in New York on May 12, and the Committee on Roadway and Ballast will meet in Chicago on June 1 and 2.

Because of the added work involved in the handling and editing of written discussions of the various committee reports this year, the 1943 volume of the Proceedings has been delayed somewhat, but, barring congestion in the bindery, it will be issued to members late in June. The annual Supplement to the Manual, incorporating all additions to and revisions of Manual material as a result of association action, as well as a complete rearrangement of Chapter 11—Records of Accounts, will be issued in July.

Metropolitan Maintenance of Way Club

The annual meeting of the club was held on April 29 at the Hotel Governor Clinton, New York. Following dinner, the meeting was addressed by R. R. Granville, a special agent of the Federal Bureau of Investigation, who spoke on "The F. B. I. at War on the Home Front," with special reference to the efforts that are being made to prevent sabotage on the railroads.

In the election of officers, M. S. Smith, division engineer, Long Island, became president; H. E. Jones, engineer maintenance of way, Lehigh & New England, was elected first vice-president; E. T. Lederman, roadmaster, Delaware, Lackawanna & Western, was elected second vice-president; and M. H. Dick, eastern editor, *Railway Engineering and Maintenance*, was re-elected secretary-treasurer. Members elected to the Executive committee, in addition to Mr. Smith, are H. J. Weccheider, division engineer, Erie; J. R. Van Lenten, track supervisor, New York, Susquehanna & Western; W. E. Kropp, supervisor work equipment, Lehigh Valley; and G. W. Hoover, manufacturers' representative.

Roadmasters' Association

Continuing the work of the association, and looking forward to the completion this year of a most helpful group of reports in the interest of aiding maintenance men in meeting their current problems, a full-day meeting of the Executive committee was held in Chicago on May 8. This meeting was attended by President E. L. Banion, First Vice-President H. E. Kirby, Second Vice-President J. M. Miller, Secretary Elinor Heffern, and Directors E. J. Brown, A. B. Hillman, Ray Marshall and F. E. Schaumburg.

In addition to giving consideration to committee reports, the Executive committee considered the status of membership at length, acted favorably upon 10 applications, and transacted considerable other business of a routine nature. It was reported that all matter to be included in the 1942 Proceedings has been set in type and that distribution of the Proceedings to members now awaits only the press work and binding, with the expectation that this will be completed late in June.

The next meeting of the Executive committee was scheduled tentatively for late in July, at which time a review will be made of all committee reports.

Supply Trade News

Personal

J. B. Tytus, vice-president in charge of operations of the **American Rolling Mill Company,** has been elected vice-president in charge of technical development and **F. E. Vigor,** who has been assistant director of the Steel division of the War Production Board has been elected vice-president in charge of manufacturing and mining operations.

Mr. Tytus, who graduated from Yale in 1897, started to work in the Armco sheet mills in 1904 as a doubler. He became superintendent of the Zanesville Armco plant in 1906, and superintendent of the Middletown sheet mill department in 1909. He was appointed assistant general superintendent in 1918. During World War I, Mr. Tytus conducted a series of experiments on the continuous rolling of iron and steel sheets, and in 1922, he built a continuous sheet rolling mill in Ashland, Ky. He was elected vice-president in 1927.

Mr. Vigor joined the Armco organization in 1910 as a traffic clerk, and was general manager of traffic when he was appointed assistant general manager of the Ashland division in 1928. He was appointed manager at Ashland in 1929. In 1941 Mr. Vigor went to Washington as a member of the Iron and Steel section of the Office of Production Management, eventually becoming assistant director of the Steel division of the War Production Board. He recently returned to again take up his responsibilities on the staff of the Armco general management.

Richard W. Torbert, assistant chief engineer of the **Oxweld Railroad Service Company,** Chicago, has been appointed assistant to vice-president, engineering, of that company, and will have active charge of service operations in maintenance-of-way and structures work. Mr. Torbert was born in Ocean City, N.J., on December 1, 1902, and graduated in civil engineering from the University of Delaware in 1926. He entered railroad service in the engineering department of the Reading at Harrisburg, Pa., and was promoted to assistant supervisor of track in November, 1926. He was advanced to supervisor of track in April, 1934, and continued in that capacity at Philadelphia, Pa., and West Trenton, N.J., until December, 1941, when he joined the Oxweld Railroad Service Company as assistant chief engineer.

Richard W. Torbert

Obituary

Wellington B. Lee, who retired in 1942 as president of the Track Specialties Company, New York, died on May 3 at the Knickerbocker hospital in that city, following a long illness. Mr. Lee was 76 years of age and had been president of the company for 27 years before his retirement.

Herbert G. Cook, railway supply representative of San Francisco, Cal., died in that city on April 28 as the result of a heart ailment. Mr. Cook represented the Dearborn Chemical Company, and other supply houses. He was at one time general storekeeper on the Southern Pacific.

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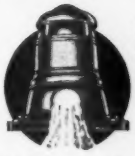

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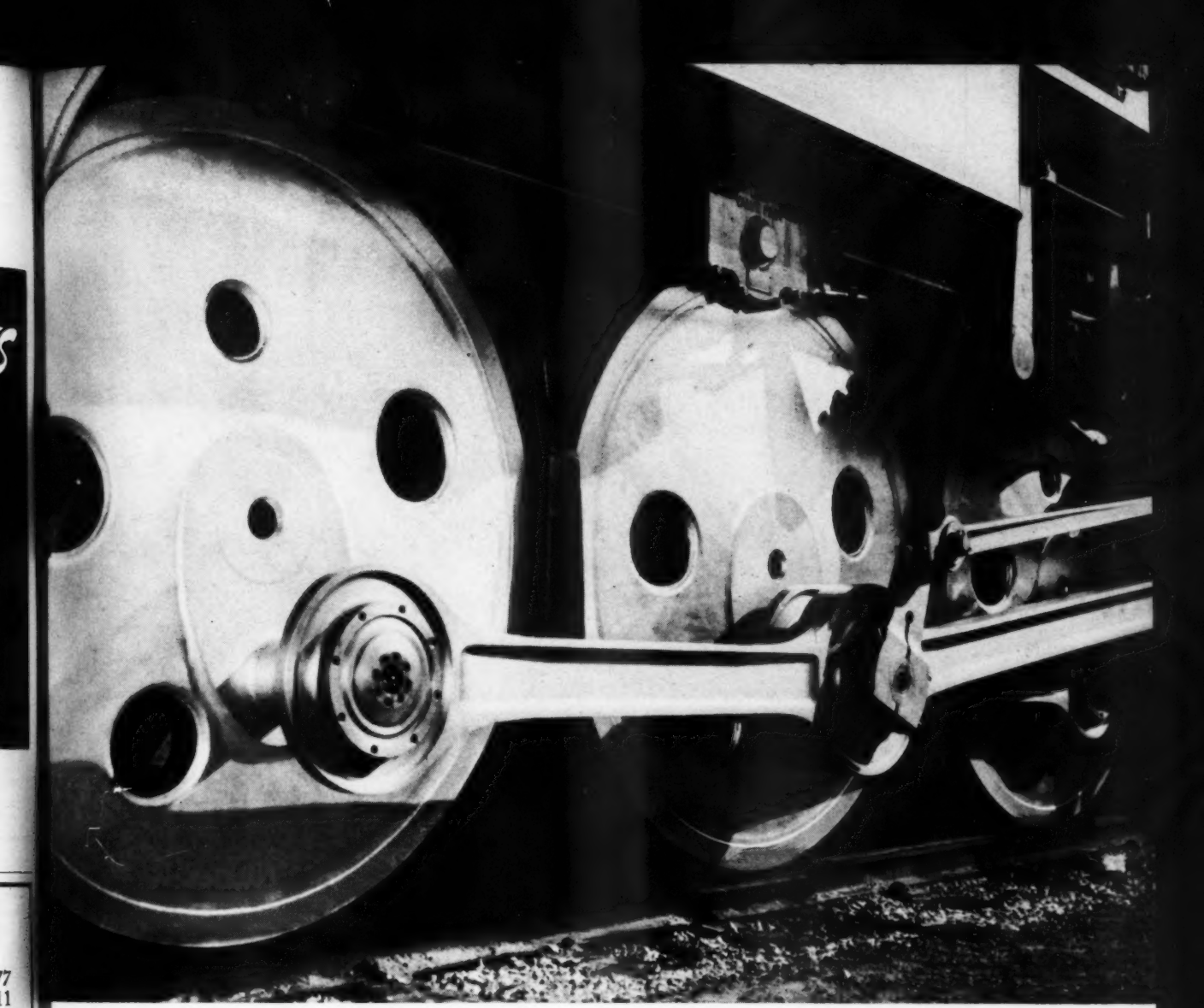

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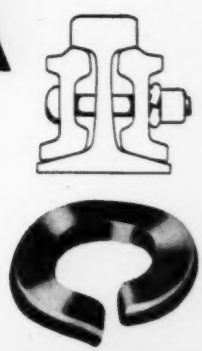

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HALF-PINT HURRICANE ON WHEELS

Moving tremendous wartime tonnages means more maintenance, more building and track-laying — a bigger job for men like you. Here's *continuous* air compression in an easy-handling, easy-breathing Blue Brute, sized right for *speed!*

Sure it's small. That's why they call it Worthington's Hand-i-Air Compressor. But 60 cubic foot capacity is enough for tie-tamping and most railroad jobs. And you'll find this "half-pint hurricane" is ready to deliver *more air* than many an air-wasting "big shot" that spends half its time in the repair shop.

It saves its breath. Like all Worthington Blue Brute Compressors . . . Portable and Semi-Portable . . . it's an "easy breather." The famous Feather* Valve means no back-talk on the job — no time-wasting rest cures, lower repair costs.

Combine it with Worthington's Blue Brute Rock Drills and Air Tools. They use *less air*. Together, they'll give you extra WORTH from air to do the big job right!

On the Job with

BLUE BRUTES

Says a Maintenance of Way Superintendent about his Blue Brutes — "If everything gave as little trouble as my Blue Brute Portables, I'd have the green light all the time!"

Blue Brutes are helping to keep vital war supplies on "GO" from coast to coast — and overseas, on railroad lifelines to the fighting fronts.

*Reg. U. S. Pat. Off.

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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